

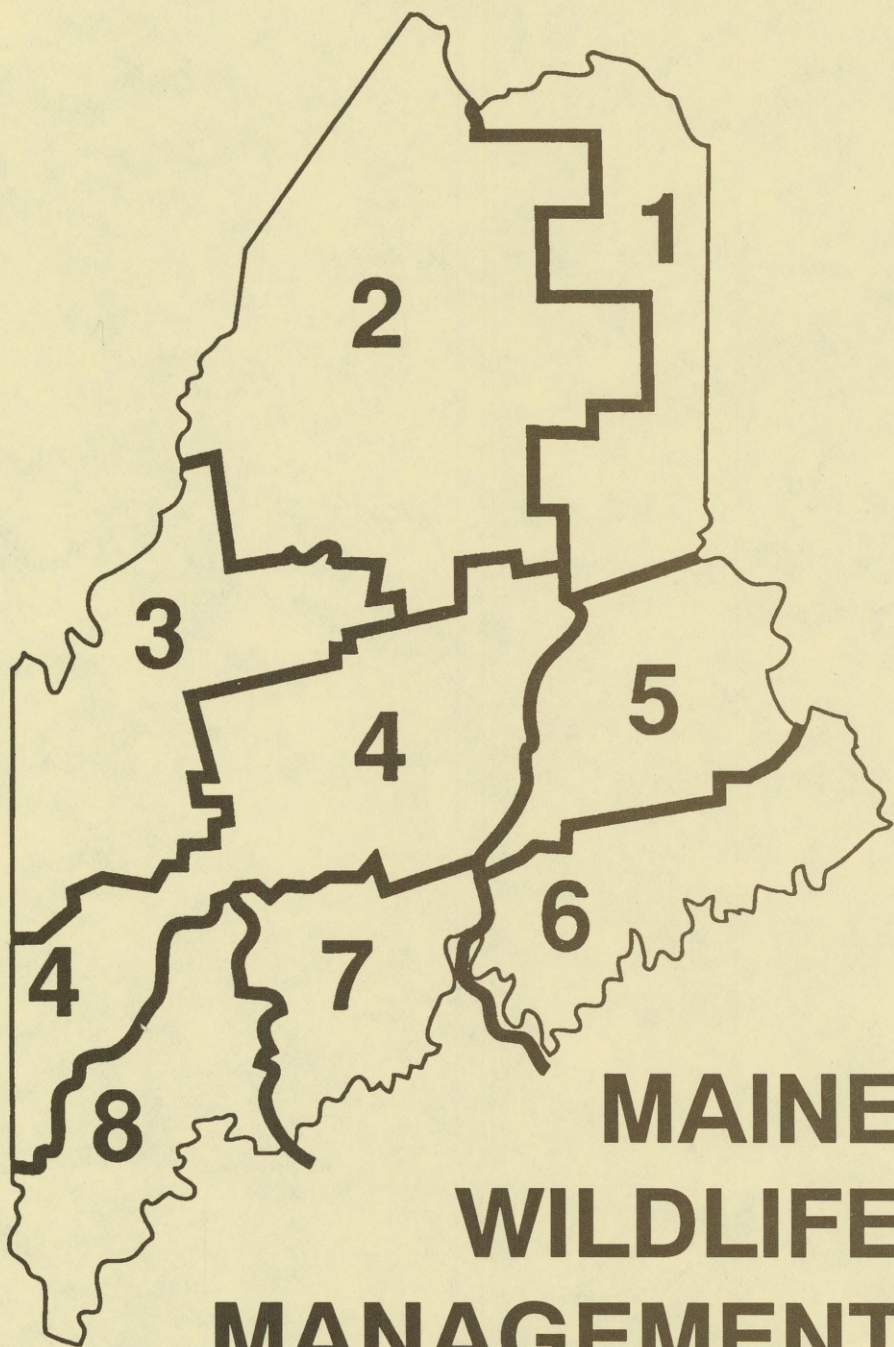
**Maine Department of Inland
Fisheries and Wildlife
Matt Scott, Acting Commissioner**

Wildlife Division

Research & Management Report 1997



George J. Matula, Jr., Editor



**MAINE
WILDLIFE
MANAGEMENT
UNITS**

INTRODUCTION

It has been a busy year for the Wildlife Division. In addition to the many critical and varied activities that you find described in this report, we have undertaken some major new directions. We have started to take advantage of some important successes in proactive habitat conservation efforts. We have signed agreements with several industrial forest landowners to cooperatively manage hundreds of thousands of acres of forestland for wildlife, as well as timber values. We continue to work with most of the major landowners to develop cooperative management agreements on lands across the state.

As outlined in the Habitat Group's section of this report, we continue to work with the Maine Natural Areas Program to implement a mapping project to identify areas that need special management consideration. This will help landowners know where they must address habitat protection regulations, or simply that there is some species on their land that we can help them protect through advice, assistance, or cooperative agreement. These areas include deer yards, locations of rare species, and high value wetlands.

As always, we are committed to balancing short-term and long-term needs of wildlife with the wishes and needs of Maine's people. I hope you enjoy this report.

Ken Elowe
Director, Wildlife Division



These studies are financed in part through Federal Aid in Wildlife Restoration Funds under Projects 81D, 82R, and 83C, and through the Endangered Species Conservation Act.

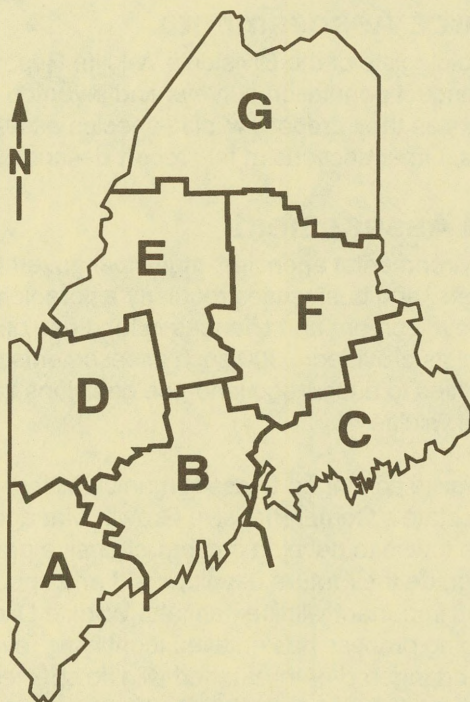
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REGIONAL WILDLIFE MANAGEMENT

The eighteen wildlife biologists who staff the Department's seven regional field offices constitute the majority of the Regional Wildlife Management Section (WMS). They are responsible for implementing the Wildlife Division's management program within their assigned geographic area (Figure 1). The Sidney regional office has two additional personnel who assist with operations at the Steve Powell Wildlife Management Area (WMA) on Swan Island and at the Frye Mountain WMA. The Regional Wildlife Management Section also employs and assigns a wildlife biologist to the Bureau of Parks and Lands (BP&L). He works with the Bureau's regional managers to implement wildlife habitat management on the state's 500,000 acres of public reserved lands and on an additional 92,000 acres of state park land. He also assists MDIFW with forest management issues on the Department's wildlife management areas.



**Figure 1. Maine Department of Inland Fisheries and Wildlife
Bureau of Resource Management Administrative Regions**

REGIONAL WILDLIFE MANAGEMENT SECTION ACTIVITIES — AN OVERVIEW

Wildlife Management Areas

The Wildlife Division manages approximately 92,000 acres in 140 properties and 300 coastal islands and ledges — many designated as wildlife management areas. Regional staff maintain existing developments and structures on the wildlife management areas, such as roads, trails, bridges, buildings, signs, boundary lines, fences, and gates. The Division's dams, dikes, and levees also require periodic maintenance and adjustment if they are to continue to provide wetland habitats for a variety of wildlife. In addition, regional biologists maintain several hundred waterfowl nest boxes on the WMAs.

Regional staff mow small fields on the wildlife management areas to set back succession and to maintain habitat diversity; plant grasses and clover for wildlife food and cover; release and prune wild apple trees or plant apple trees; and maintain goose pastures. They also plan and conduct annual timber management activities on the Division's WMAs to enhance wildlife habitat.

Wildlife Resource Assessments

WMS staff work with biologists of the Division's Wildlife Resource Assessment Section (WRAS) to conduct population surveys and inventories; they also assist WRAS biologists as they prepare wildlife species assessments and management systems. Other sections of this report describe these activities.

Environmental Assessment

State and Federal environmental agencies, municipal governments, consultants, landowners, and businesses regularly ask regional biologists to assess the effect of development and changes in land use on wildlife. Over the last year, WMS biologists provided 1,300 such assessments as they worked with these various entities to encourage land-use decisions that are sensitive to the habitat needs of wildlife.

Regional wildlife biologists continued to assist municipalities with the implementation of the state's Comprehensive Growth Management Act. This act encourages Maine towns to develop a comprehensive growth management plan to guide their future development and specifically requires that each plan address important wildlife habitats. Wildlife Division involvement in this statewide planning process has entailed identifying, evaluating, and mapping habitats of endangered or threatened wildlife species; deer wintering areas; waterfowl and wading bird habitats; shorebird nesting, feeding, and staging areas; and seabird nesting islands.

Animal Damage Control

Although wildlife has many positive attributes, it can, at times, become a nuisance or pose a hazard. It is the function of the Division's Animal Damage Control program to address and remedy such problems. Wildlife biologists, game wardens, and 200 registered ADC agents handle hundreds of nuisance wildlife complaints annually. Many complaints involve beaver plugging culverts or building dams at inappropriate locations, which flood roads or other developments. The ADC program also responds to problems involving coyotes, bear, deer, Canada geese, and to "house and garden" complaints involving raccoons, skunks, woodchucks, and squirrels.

Deer Wintering Areas

During the winter, when snow conditions force deer to "yard up" in softwood stands, WMS biologists conduct aerial surveys to locate and map deer wintering areas. After the biologists locate the DWAs, they conduct ground surveys in them to assess the number of deer using the area and the characteristics of the yard's softwood cover. In Maine's unorganized towns, biologists use this information to develop long-term, cooperative management agreements with forest landowners; or they may present it to the Land Use Regulation Commission (LURC), which has the authority to zone the deer wintering area if it meets certain established standards. In the organized towns, wildlife biologists provide the municipalities with maps showing DWA locations. The state's Comprehensive Growth Management Act encourages the municipalities to consider these DWA locations in their comprehensive plans.

Many land-use activities within zoned DWAs in the unorganized towns, such as timber harvesting, require review and comment by MDIFW. This past year, WMS biologists helped various private landowners, including large industrial forest landowners, develop prescriptions for land-management activities on 1,200 acres within zoned DWAs.

Wildlife Introductions

Regional biologists continued their successful efforts to reintroduce the wild turkey to its historical range in Maine. In addition, they monitored existing flocks of wild turkeys established by earlier releases. The Bird section of this report contains additional information about wild turkey management.

— G. Mark Stadler, Supervisor, Regional Wildlife Management Section

WILDLIFE MANAGEMENT SECTION HIGHLIGHTS

Bureau of Parks and Lands

During the 1996 field season, the Bureau of Parks and Lands hired Joel Flewelling, a Unity College junior majoring in wildlife management, to fill a seasonal position that is part of a cooperative wildlife management agreement between the Dept. of Conservation and MDIFW.

Joel conducted thirteen waterfowl brood counts, assessing waterfowl production at two of the Bureau's managed impoundments, at two potential impoundments, and at three natural wetlands. He searched nine lakes for the location of loon nests — this information allows the Bureau to avoid developing water access campsites or hand-carry boat access sites where they might affect nesting loons.

BP&L assisted MDIFW with the peregrine falcon reintroduction effort on the Nahmakanta unit. Joel monitored two potential peregrine falcon nest sites for activity. He observed territorial defense behavior at Bigelow Mountain.

Managing deer wintering areas is an important component of the Bureau's wildlife program. As part of this effort, Joel assessed the efficacy of manually removing hardwood competition on softwood saplings in the Mitchell Brook DWA at Scraggly Lake; assessed post-harvest softwood stocking in the Round Pond DWA at T13R12; and measured the density of softwood regeneration in the DWA in Reed Plantation prior to a scheduled thinning.

Throughout the summer, Joel installed water-control devices at "nuisance" beaver sites to maintain wetland habitat while protecting roads; conducted ruffed grouse drumming counts at the Duck Lake grouse management area to evaluate habitat management; released apple trees in Topsham and flagged apple trees to be released by volunteers at Hebron; and collected soil samples from several old field management sites for nutrient analysis.

— *Joseph E. Wiley, Staff Wildlife Biologist*

Region A—Gray

Over the last year, the rabies epidemic that has spread northward from New Hampshire into the lower four counties of Maine has demanded the close attention of wildlife biologists in Region A.

The Public Health Lab tested more than 1,000 specimens for rabies during 1996 — 131 were positive, and over ninety percent came from Region A. Currently, there have been ninety-one positive rabies cases during the first four months of 1997, as compared to twenty-eight during the same period in 1996. Of the ninety-one cases, eighty-nine were in wild animals — raccoons,

skunks, and foxes are most susceptible — while two were in domestic animals. Animal Damage Control agents and town animal control officers routinely handled many more abnormally acting animals, but the Public Health Lab did not test these because they did not come in contact with a human or domestic animal.

With the progressive movement of raccoon rabies into Maine, the public, sportsmen, animal control officers, Animal Damage Control agents, and Department personnel need to be aware of the problems associated with the disease and the correct procedures for handling specimens. The regional staff has been instrumental in coordinating the handling and collection of specimens and their transportation to the Public Health Lab. The region has also participated in MDIFW's efforts to educate the public about rabies through development of a public service announcement, meetings with trappers' associations, and meetings with Department personnel. The rapid movement of rabies into Maine, and the associated public health and safety concerns, makes this level of regional coordination essential. It is also critical to have close cooperation with a wide variety of organizations to ensure prompt handling of specimens.

— *Philip A. Bozenhard, Regional Wildlife Biologist*

Region B—Sidney

In April, Region B staff, the residents of Monhegan Island Plantation, and the Maine Department of Agriculture cooperated in a unique project to reduce the island's deer population to approximately fifteen deer per square mile. Monhegan residents petitioned MDIFW to reduce the number of deer on the island because Lyme Disease threatened their health and economy. Monhegan is an isolated 600-acre island, approximately ten miles off the state's mid-coast.

Maine Medical Center has conducted Lyme Disease research on Monhegan since 1989, demonstrating a tick—human attack rate “approaching that in the hyperendemic areas of New York and Connecticut.” In 1994, MMC researchers began feeding to deer corn treated with Ivermectin — a drug used to poison ticks during their reproductive stage as they feed on deer — intending to break the tick life cycle. MDIFW closed the hunting season to accommodate the effort. Since September 1994, researchers fed the deer more than ten tons of treated corn. Nevertheless, the incidence of Lyme Disease grew, as did the deer population, and the risk of contracting the disease increased.

MDIFW considered a variety of alternatives to reduce Monhegan's deer population, including trap and transfer, contraception, recreational hunting, and the use of Department staff to lethally remove deer. None proved to be viable. MDIFW and Monhegan decided to hire an experienced population control specialist who would lethally remove the surplus deer.

The contractor, White Buffalo, Inc., humanely dispatched fifty-two deer in three evenings. MDIFW staff quickly collected the carcasses, and professional meat cutters prepared them for the state's Emergency Food Assistance Program. The deer reduction project produced approximately 1,800 pounds of meat.

MDIFW collected a variety of data from the culled deer. The Department will use this information to establish a harvest prescription for recreational hunting that will reduce the incidence of Lyme Disease and maintain Monhegan's deer herd in balance with its habitat.

— *Eugene A. Dumont, Regional Wildlife Biologist*

Region C—Machias

MDIFW, working with other state, Federal, and non-profit conservation organizations, has secured and protected 1,625 acres of coastal wetlands around Cobscook Bay and consolidated the acreage into seven wildlife management areas (WMAs). The Department has also obtained conservation easements on an additional 1,660 acres of private land, with management oversight on 1,500 acres. The North American Waterfowl Management Plan — an international strategy to protect important wintering habitat for waterfowl, administered by the U.S. Fish & Wildlife Service — guided these acquisition efforts around Cobscook Bay, a priority “focus area” in Maine.

As with other WMAs, those around Cobscook Bay represent a significant public benefit. They conserve important wetland and upland habitats, provide open space for compatible recreation, and demonstrate habitat management techniques applicable to private land. For example, we have improved roads, developed parking areas and hiking trails, and installed informational signs to provide recreational opportunities. Our habitat management efforts have focused on re-claiming overgrown fields; and we are liming, fertilizing, and seeding portions of them to create nutritious herbaceous forage for wildlife. Future plans include releasing and pruning apple trees and hawthorns; rejuvenating stands of aspen, birch, and alders to benefit upland game birds; and assessing forest stands for their habitat values and management needs.

The Cobscook Trails coalition — local business sponsors and six state, Federal, and non-profit conservation landowners, including MDIFW — has produced a hiking-trail guide for the Cobscook Bay conservation lands. The coalition intends for the guide to stimulate tourism and enhance the economy of Eastern Washington County. It has also hired a trail steward who will monitor the properties, perform minor maintenance, provide interpretation to hikers regarding the purpose and management of the properties, and develop a network of volunteers to maintain the trails. The Department has included four WMAs and one easement property in this venture.

— *Thomas L. Schaeffer, Regional Wildlife Biologist*

Region D—Strong

It all began when Dodger, a three-year-old beagle, owned by Butch McCormick of Wilton, went out to hunt rabbits in western Maine. Little did Dodger know that trouble was “a-bruin” when he ran off, his sights set on a deer trail.

Aided by the dog’s radio collar, McCormick set out to look for his wayward pooch. Persistence paid off three days later when he located Dodger’s tracks and followed them to a snow-covered brush pile. Attempts to retrieve his dog failed when McCormick realized that his pooch had stumbled into a bear’s den, and mama bear was not anxious for the dog to leave.

On day four, regional staff, armed with tranquilizing equipment, prepared to extricate Dodger from his grizzly confines. Each time the dog tried to leave the den, the bear would grab his hind leg in her mouth and coax him back. This gentle tug-of-war continued until we were finally able to grab the pooch by his collar and pull him free, at which time the bear also left the den, leaving two cubs behind. Concerned that the young cubs would not survive the cold weather forecast for the night ahead, we bundled them up in blankets and hoped that their mother would return. This bizarre tale of mistaken identity ended happily when we returned the following morning and discovered that mama bear was back. As for Dodger, he was fine, albeit hungry and dehydrated, after his four-day standoff.

Four weeks later we obtained a bear cub, orphaned when a logger accidentally ran over a bear’s den with his skidder. Since our much-publicized bruin eagerly accepted a dog, we figured that her den was a perfect home for the orphan. When we arrived at the den with the young cub, we discovered that mama bear had moved her family to a brush pile 150 yards from her former den site. As we quietly lowered the little orphan into the den, mama awakened from her late winter’s nap long enough to grab the little cub and tuck it under her body. Unlike Dodger, this little one seemed content to stay.

— *Sandra L. Ritchie, Regional Wildlife Biologist*

Region E—Greenville

Until recently, the meningeal worm (an internal parasite of the spinal cord and brain) and the winter tick (an external parasite) were the only parasites known that could significantly alter the health of Maine moose. Necropsy results from a calf moose that died in the Moosehead Lake Region indicate there may be another.

During February 1995, I received a report of a calf moose lying down in a garage in Frenchtown Township. I first thought meningeal worm infected the calf, but as we slowly approached the garage, the young moose saw us, stood up, and bolted to nearby woods. Obviously, the moose was alert and not exhibiting behavior consistent with meningeal worm infection — fearlessness

of people, circling, and poor coordination. Three days later and about a third of a mile from the garage, we found a dead calf moose near a snowmobile trail. Our field necropsy noted damage to the lungs, a pneumonia-like condition. Further analyses revealed that lung worms had damaged the calf's lungs, contributing to its death. Later that winter, we necropsied 10 moose in the Moosehead Lake Region. Most were calves with significant lung damage and moderate-to-high winter tick infestations.

During the 1995-96 winter, moose mortality in the region was much lower. There were several reports of dead moose, but only one confirmed case of lung worm. I concluded that the previous winter's mortality had been an anomaly. These thoughts quickly faded this past winter when I started receiving reports of weak, sick, or dead moose in March. By the end of May, we had necropsied twelve moose, ten of which had significant lung damage and moderate-to-high winter tick infestations. We had also received reliable reports of at least fifteen other dead moose.

Presently, we are unsure how infestations of lung worm and winter tick contribute to moose mortalities or to what degree. We will continue to monitor and assess this source of mortality.

— Douglas M. Kane, *Regional Wildlife Biologist*

Region F—Enfield

Staying current with new technology is important in any field of endeavor, whether medicine, engineering, or wildlife management. Wildlife biologists make many field observations. Our field notes must precisely describe our observations, and an important aspect of any field observation is its location. Global Positioning System (GPS) technology allows us to electronically record and store specific locations as GPS "waypoints," exact geographic coordinates. GPS technology offers regional biologists the opportunity to become more productive in gathering and recording the information used to manage wildlife.

The Wildlife Division first acquired hand-held GPS units in late 1996. In Region F, we immediately started experimenting, quickly discovering the unit's usefulness. For example, we use GPS positions to monitor and assess timber management in deer wintering areas. By recording the location of a specific forest stand in a DWA and noting its associated timber management prescription, we can use a GPS unit to return to that stand at any time, even ten or twenty years later. This allows us to determine if the landowner has followed the recommended practice or to review the long-term effects of management. Another use of GPS is plotting the locations of unmapped roads and trails while running bobcat surveys. Since biologists conduct bobcat surveys along the same routes each winter, we store the routes in the unit's memory so that a person unfamiliar with the route may run it in future years, and be certain that he or she has the correct location.

Warden Service equips their aircraft with GPS units for routine navigation, but they are also useful when biologists use the planes to conduct wildlife surveys, such as inventorying DWAs. Biologists survey DWAs by flying along parallel transect lines, which they have predetermined by plotting them on topographic maps, and searching for concentrations of deer tracks and trails in the snow. Actually flying the lines established on the paper map can be difficult, especially where obvious landmarks are few. We experimented with plotting the GPS coordinates of the routes beforehand and uploading them to the aircraft's GPS unit. Warden pilots can also mount a laptop computer in front of the observer conducting the survey, which integrates with the plane's GPS. The computer runs software that produces a map of the area being flown on its screen; a symbol representing the aircraft's location passes over this on-screen map. These technologies allow the pilot to simply follow an arrow on the navigation screen to stay on the mapped survey line. Biologists use the GPS to electronically record and store the locations of wintering deer. Later they download these waypoint observations for precise plotting on a map and further analysis.

— Kevin C. Stevens, *Regional Wildlife Biologist*

Region G—Ashland

Managing white-tailed deer can be challenging, but this is especially true in northern Maine where wildlife biologists contend with several limiting factors: 1) although extremely variable, our snow depths and winter temperatures are often severe; 2) the previous spruce bud worm epidemic and past cutting practices have diminished the number of our deer wintering areas and the quality of their winter shelter; and 3) coyotes have had a greater impact on our deer herd due to its lower density (number of deer per square mile). Biologists can not manage the first factor, but they can manipulate or change the others to directly affect deer management.

Region G is working with industrial forest landowners to develop long-term, cooperative management agreements that enable the Department to maintain the large, important blocks of winter habitat — stands of balsam fir, spruce, cedar, and hemlock — used by deer. As part of each agreement, the landowner develops a management plan that perpetuates the area's shelter quality. The landowners benefit because MDIFW does not propose the area for zoning and the plan provides certainty, predictability, and management flexibility for timber harvesting and other land management activities. DWAs provide habitat for many other wildlife species besides deer — another benefit of this effort.

The Region has implemented long-term plans, or is working on their development, with Great Northern Paper Company, Fraser Papers, Seven Islands Land Company, International Paper Company, Irving Paper Company, the Bureau of Public Lands, and White Oak, Inc.

Due to our concern about coyote predation on deer, Region G has increased its efforts within the "coyote snaring program." Regional biologists direct Animal Damage Control (ADC) agents to remove coyotes from deer wintering areas where predation is occurring. Snaring coyotes in these wintering areas can reduce the number of deer killed and enhance the number of deer within the region.

— Richard T. Hoppe, Regional Wildlife Biologist



MAMMALS

BLACK BEAR

Maine is "bear country" to many outdoors enthusiasts fascinated by its large and thriving population of black bears. An estimated 22,000-23,000 bears range over all but the heavily settled southern and central-coastal portions of Maine (Fig. 2). Bear habitat is forest land, and Maine's bear range is covered by second-growth forests. Thick stands of spruce and fir, and maple-beech-birch associations dominate the State's northern forests. White pine-hemlock and oak-pine forests prevail in the southwestern portions of bear range, and eastern Maine's spruce-fir forests are broken with blueberry barrens.

The State's bear resource is largely a product of private lands, as 80% of Maine's forestlands are privately owned. Most of Maine's northern and western bear range is commercial forestland managed for timber production. Potato, dairy, and grain farming are important land uses in central and northeastern Maine, and southeastern portions of the bear range are used for commercial blueberry production. Bears require forests for cover and food, and generally benefit from man's logging activities. Regenerating clear-cuts provide berries, insects, and succulent vegetation for bears to feed on, and thick escape cover. However, bears also depend on mature stands of hardwoods for beechnuts, which are a major late fall food for them in northern Maine. Beech trees do not produce nuts until they are 40-50 years old. Therefore, long-term maintenance of the State's bear population requires planning to assure a ready supply of older stands of hardwoods and beechnuts.

Black bears support a thriving recreational economy, and the population is an important big game resource in Maine. When the last economic assessment of the bear resource was completed in 1988 (nearly a decade ago), the bear population generated 6.4 million dollars in hunting trip-related expenditures (Reiling et al. 1991). Nonresident hunters spent over half of the money directly related to bear hunting, and added 3.5 million dollars to the State's economy.

Bears are popular quarry of nonresident sportsmen and women, but a strong contingent of resident hunters also pursue bears each year. Over 60% of recent bear harvests were registered by nonresidents, and about half of all successful hunters employed Registered Maine Guides to guide or outfit their hunts. We've monitored bear harvests by mandatory registration of hunter-killed bears since 1969. The Department's Bear Study began in 1975 as a long-term research and monitoring program supplying data on the population dynamics, movements, and behavior of bears for management purposes.

Harvest Information

Maine's bear season framework has remained relatively constant since 1990, with a 3-month fall season that is divided into shorter periods of opportunity according to hunting method. The annual bag limit is 1 bear per hunter. Legal methods of take include baiting, running with hounds, stillhunting and stalking, and trapping. The season framework appears complex at first glance, but it has minimized conflicts among hunters employing different methods and remains popular.

During 1996, hunters could use bait during a 4-week period from August 26 through September 21. Houndsmen could take bears during an 8-week period from September 9 through November 1. The houndsmen's season overlapped the last 2 weeks of baiting season, and ended immediately prior to the opening of the 4-week firearms deer season in early November. Bear trapping season opened September 22 and closed October 31. Hunters could also pursue bears during the 4-week firearms deer season (November 2 - 30), but baiting and use of hounds was prohibited during that period. Stillhunting and stalking of bears were the only methods permitted throughout the entire season (August 26 - November 30).

Hunters harvested 2,246 bears in 1996 (Table 1), marking a return to the objective harvest levels (1,500-2,500 bears/year) that had been maintained from 1990-1994. Hunting periods for hunters using bait and hounds were shortened in 1990 to restrict harvest and promote population growth. A near-record harvest was recorded in 1995, linked to bears' extreme interest in bait following a summer drought. Fall foods were abundant in 1996, and last year's

Table 1. Maine bear harvests by county, 1987-1996.

COUNTY	Year									
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
ANDROSCOGGIN	1	0	0	2	1	1	3	2	1	2
AROOSTOOK	694	876	863	610	517	630	610	626	829	705
CUMBERLAND	5	2	4	7	1	5	7	2	4	0
FRANKLIN	151	133	171	134	68	92	115	87	139	132
HANCOCK	92	141	99	88	90	99	104	106	122	113
KENNEBEC	4	1	3	3	3	0	0	1	1	0
KNOX	1	0	0	0	1	0	0	0	0	1
LINCOLN	0	0	0	0	0	0	0	0	1	0
OXFORD	158	195	148	149	112	168	204	172	247	190
PENOBSCOT	322	310	351	250	217	261	268	343	337	283
PISCATAQUIS	426	424	462	384	269	342	294	326	351	338
SAGadahoc	0	0	0	0	0	0	0	0	0	0
SOMERSET	315	301	330	276	215	265	252	267	270	267
WALDO	2	0	2	3	1	0	0	0	1	0
WASHINGTON	220	282	248	164	161	176	195	305	321	208
YORK	3	4	4	9	0	3	3	6	22	7
UNKNOWN	0	4	0	9	9	0	0	0	0	0
STATEWIDE	2,394	2,673	2,690	2,088	1,665	2,042	2,055	2,243	2,645	2,246

bear harvest rate reflected lower bait response in early fall, and the plentiful supply of late-foraging bears in November. Many of the Bear Study's radiocollared research bears delayed den entry until December — the latest den-entry recorded during 22 years of study! Bears usually enter dens in mid-late November when food is abundant, as deepening snow covers nuts scattered on the forest floor.

Research-based estimates of bear densities, survival, and reproduction indicate the bear population increased slowly through 1996, with a spring 1997 population estimated at 22,000 - 23,000 bears. The Department's management objective is to maintain a population near 21,000 bears. Although the bear population is slightly above the desired level, we do not plan to change management actions until after public review and reassessment of our population management system, which is scheduled for 1998. Most bears (1,358) were taken over bait in 1996 (Table 2). Houndsmen registered 273 bears, and 41 bears were taken by trappers. Many bears were taken early in the season, with nearly half of the harvest registered during the first 2 weeks of the hunt. The late season harvest, concurrent with the November-based firearms deer season, continued to fluctuate strongly in association with variable late-fall mast abundance. Years of heavy beechnut crops have produced late-season bear harvests of 350-700 bears; 150-250 bears are usually taken in Novembers of light beechnut crops. The 1996 firearms deer season produced 458 bears.

Table 2. 1996 Maine bear harvest by Wildlife Management Unit and method of take.

Method of Take	Wildlife Management Unit								STATE
	1	2	3	4	5	6	7	8	
Hunting with bait	255	494	194	175	176	101	1	2	1,398
Hunting with dogs	31	30	74	49	67	22	0	0	273
Trapping	8	4	13	4	9	3	0	0	41
Unknown	90	173	83	119	40	26	0	3	458
Total	384	701	364	347	292	152	1	5	2,246
Archery	42	47	40	31	30	14	0	0	204
Assisted by guide	197	489	198	128	167	53	1	0	1,233

We've tracked hunter numbers through bear permit sales since 1990. Bear permits are required in addition to the general big game hunting license for bear hunting prior to the firearms deer season. Permit sales have been relatively stable at 10,000 - 11,000 each year since 1991, and hunters purchased 10,924 permits in 1996. About 95% of nonresident permit holders and 75% of resident permit holders participate in the bear season; 8,000-8,500 hunters actually take to the woods looking for bears.

Management Programs

Maine's bear management system controls annual sporting harvests as the primary means of affecting bear numbers. A formal Bear Management

System documents the information used to assess the status of the bear population and bear habitat, and provides criteria for decision-making. The management system arose from comprehensive planning efforts in 1985, which included considerable public input before long-range management goals and objectives were set for the bear resource. This system has repeatedly proven itself over the past decade, providing guidance for management actions that are understood and accepted by the public user groups that they affect. The system accommodates social concerns in management activities, while attaining biological objectives. Within the Department, a well-documented decision-making system eliminates indecision and provides timely response to management issues. The bear management system will be revised in the future, as we learn more about bears in Maine, and as new pressures are placed on the resource.

No major changes in the bear season are planned for 1997. Hunting over bait will be permitted from August 25 through September 20, and houndsmen may harvest bears from September 8 through October 31. The 8-week hound season includes a 2-week period when bait hunters will also be taking bears. The bear trapping season will be expanded by 3 weeks, opening September 1 and closing October 31. Stillhunting and stalking will be permitted throughout the season, from August 25 until November 29.

Bear hunters pursuing bears prior to the opening of the firearms deer season (November 1) will again be required to purchase a bear hunting permit in addition to a big game license. Permit costs are \$5 for residents and \$15 for nonresidents, plus a \$1 issuing fee. Big game license costs are \$19 for residents and \$85 for nonresidents (plus \$1 issuing fee). No limits are placed on the number of bear permits available.

Research Programs

The Bear Study is staffed by 2 biologists, who are assisted on a seasonal basis by an additional staff biologist and seasonal contractors. Field research studies are concentrated in 3 study areas, each comprising about 144 mi² or 4 townships (Fig. 2). We selected the study areas to be representative of large expanses of Maine's bear habitat. The Bradford area has some agricultural lands, very limited beechnut production, and good road access. Stacyville is a mixture of big-woods country containing beech near Baxter State Park to the west, and active and reverting agricultural lands in the east. Spectacle Pond is a backwoods setting in commercial forest land: no permanent habitation, plentiful hardwood stands containing beech trees, and no agricultural influence. Telemetry studies are continuing in each of these areas, with live-capture efforts at the Bradford and Spectacle Pond study areas supplying additional data on population parameters. We are monitoring about 60 female bears, and capture and handle about 150 bears annually. Numbers of radiocollared female bears have been maintained primarily by collaring yearling females during winter den visits. We live-trapped in the Bradford area

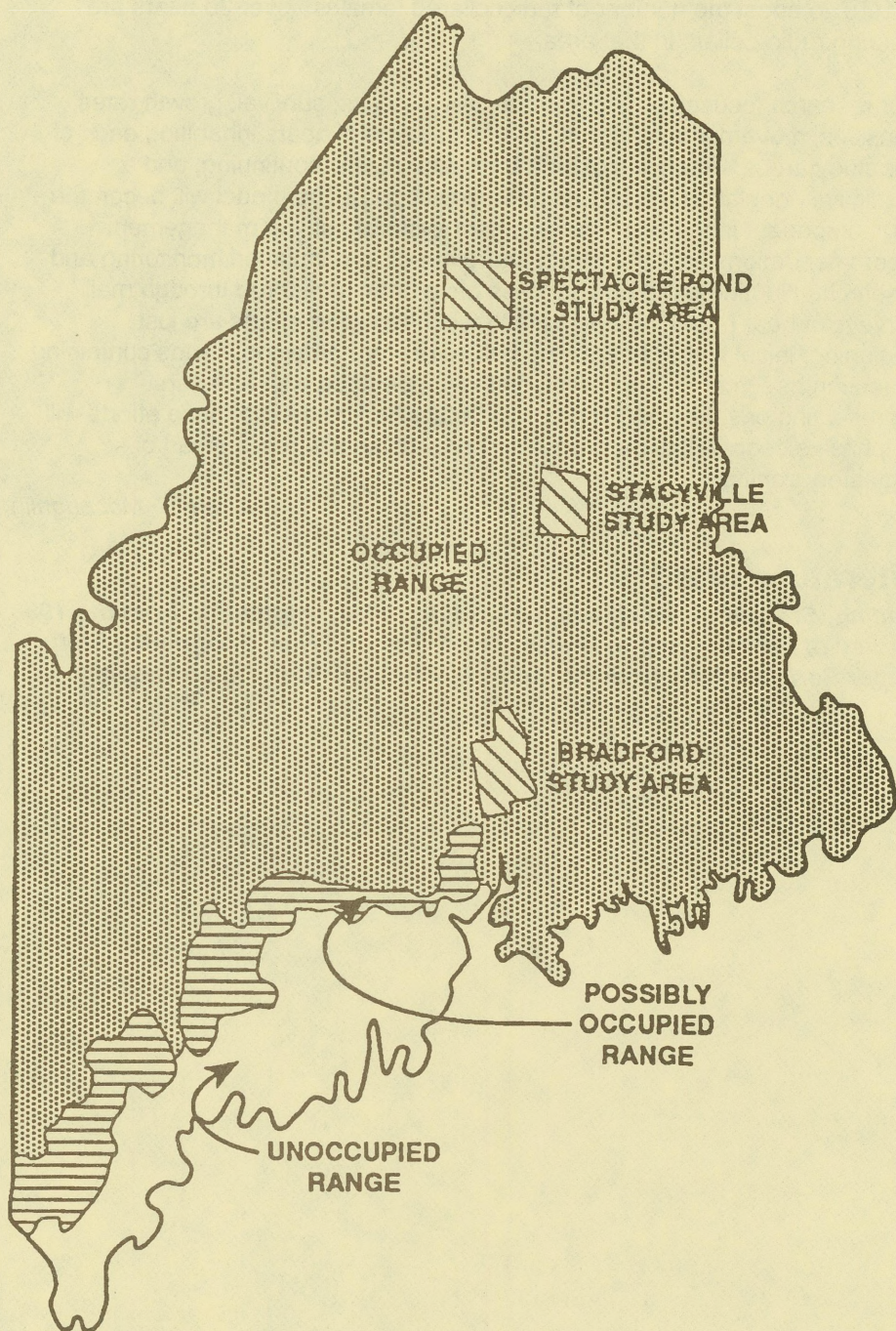


Figure 2. Maine bear range and location of three study areas.

in 1997 to boost the number of radiocollared females; over 20 bears are wearing radio-collars in that area.

Our research focuses on the reproductive success, survival, growth rates, densities, movements, and habitat-use patterns of bears inhabiting each of our study areas. Analyses of long-term data sets is continuing, and a predictive population model has been developed. The model will become a key component in the bear management system, guiding management recommendations and identifying future needs in population monitoring and research. Hunting effort and success have been monitored through mail surveys of bear permit holders. Habitat conservation efforts are just beginning; initial timber harvesting guidelines for hardwood stands containing American beech are being developed in cooperation with foresters representing private landowners. Our future habitat maintenance efforts will emphasize cooperative programs with private landowners instead of regulatory zoning.

—Craig R. McLaughlin

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FURBEARERS

Furbearers include all mammals harvested primarily for their pelts. In Maine, these are the coyote, red and gray fox, bobcat, fisher, marten, raccoon, skunk, short- and long-tailed weasels, mink, otter, beaver, muskrat, and opossum. Lynx are present in very low numbers, and are protected year-round. All other furbearers may be trapped during trapping season. Fox, coyote, bobcat, raccoon, and skunk may also be taken by hunting.

1996-97 Fur Harvest

Trapping in 1996-97 for all furbearers, except beaver, was allowed from November 3 through December 31. As in past years, there was an additional trapping season for fox and coyote that ran from October 27 to November 2. The beaver season ran from December 1 through March 31 in Wildlife Management Units (WMUs) 1, 2, 3 and 5; from December 15 through February 28 in WMUs 4, 6 and 7; and from January 1 through February 28 in WMU 8. Additional sections of WMUs 2 and 4 had extended opportunity for beaver trapping this year.

Hunting Seasons were as follows: October 1 through December 31 for raccoon; October 1 through November 30 for gray squirrel; October 1 through March 31 for cottontail and snowshoe hare; October 28 through December 31 for skunk and opossum; October 28 through February 28 for fox; and December 1 through January 31 for bobcat. There is no closed hunting season for coyote, woodchuck, porcupine, or red squirrel. All Sundays are closed to hunting of any species in Maine. Pelts of all furbearers, except weasel, raccoon, muskrat, skunk, and opossum must be tagged by an agent of the MDIFW so an accurate count of the harvest can be obtained.

Aquatic furbearers were harvested in greater numbers in 1996-97 than last year (Table 3). Most notably, the beaver harvest was the second highest since the record harvest in 1979-80 of 19,209 beaver. Last year's harvest was the second highest on record since 1915. The high take of beaver this year was due, in part, to an increase in spring pelt prices. Spring prices for beaver pelts averaged \$35, substantially above the season average (Table 4). Otter were harvested in higher numbers this year than in 1995-96 (Table 3). Because beaver and otter occur in similar habitats, otters may be caught incidentally by beaver trappers. This year's increase in the otter harvest, therefore, may be attributed to an increased effort in beaver trapping. Unlike the beaver and otter harvests, the mink harvest did not change from the 1995-96 season. Muskrat pelt prices were more than double the 1995-96 prices, and likely encouraged a higher muskrat harvest.

Except for gray fox and marten, the harvest of upland furbearers did not change substantially from the 1995-96 season. The lower marten harvest was expected because of a good beech nut crop this past fall. Our data are

Table 3. Furbearer harvests in Maine, 1990-Spring 1997.

	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97
Mink	2,068	1,803	1,881	1,549	1,341	1,365
Otter	759	887	908	1,324	760	1,237
Beaver	10,636	9,619	8,177	15,251	7,336	16,640
Marten	3,292	2,090	3,119	2,199	4,478	2,208
Fisher	1,603	1,345	1,623	1,546	1,756	1,886
Fox (R & G)	2,039	1,974	1,791	2,236	2,097	1,624
Coyote	1,222	1,356	1,410	1,647	1,440	1,587
Bobcat	119	123	180	157	175	128

insufficient, at this time, to determine whether the low gray fox harvest in 1996-97 reflects a change in the gray fox population. Pelt prices for upland furbearers were higher this year. In particular, coyote, red fox, male fisher, and marten pelt prices were above the 5-year average (Table 4).

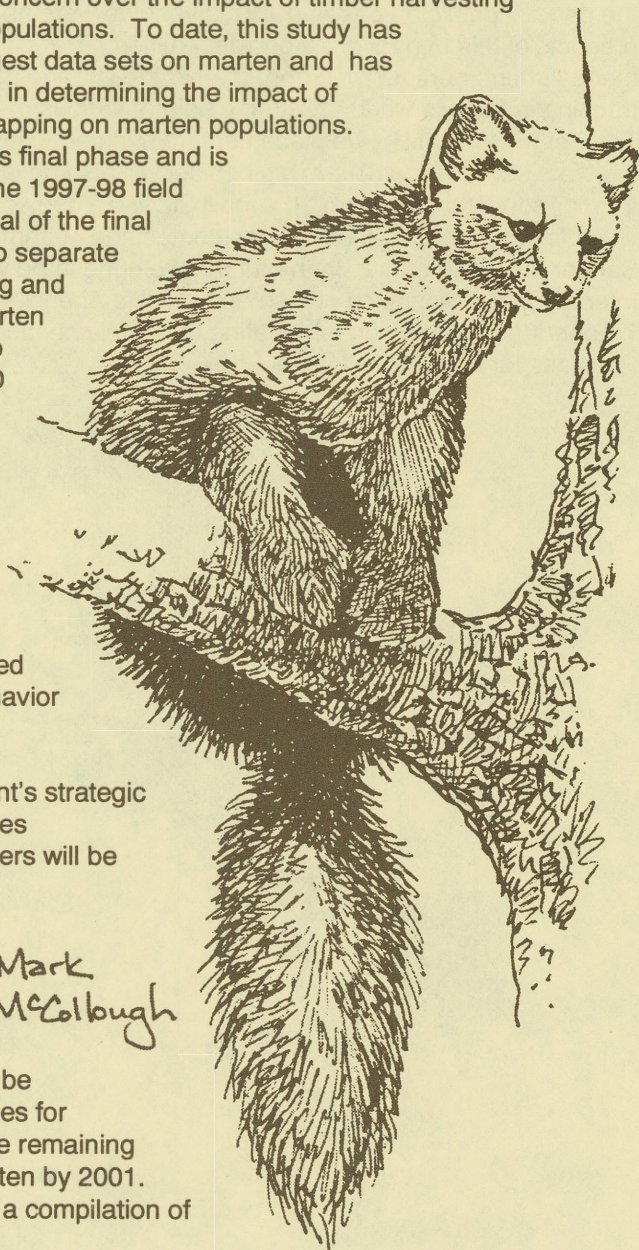
Table 4. Average prices paid for pelts, 1991-1997 trapping seasons.

Species	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97
Raccoon	\$6.00	\$7.00	\$9.00	\$9.00	\$10.00	\$17.00
Mink:						
Male	33.00	29.00	26.00	22.00	16.00	24.00
Female	18.00	16.00	13.00	11.00	14.00	16.00
Otter	25.00	29.00	50.00	52.00	42.00	46.00
Beaver	13.00	9.00	20.00	17.00	22.00	27.00
Marten	31.00	22.00	25.00	24.00	21.00	29.00
Fisher:						
Male	19.00	12.00	14.00	14.00	15.00	22.00
Female	51.00	33.00	29.00	30.00	27.00	40.00
Red Fox	13.00	10.00	14.00	16.00	16.00	20.00
Gray Fox	8.00	-	10.00	8.00	-	12.00
Coyote	14.00	20.00	20.00	16.00	12.00	20.00
Bobcat	38.00	25.00	30.00	30.00	25.00	25.00
Muskrat	1.90	1.50	2.00	2.00	2.00	4.14

Management and Research

Since 1988, MDIF&W has cooperated with Dr. Harrison, at the University of Maine - Orono, on a marten research project. The goals of this 10 year study were to document the effects of trapping, road access, and commercial timber harvesting on marten populations in northern Maine, and to provide recommendations on ways to sustain profitable forest harvesting while maintaining viable marten populations. Throughout the range of marten in North America there is concern over the impact of timber harvesting operations on marten populations. To date, this study has produced one of the largest data sets on marten and has made significant inroads in determining the impact of timber harvesting and trapping on marten populations. The original study is in its final phase and is scheduled to end after the 1997-98 field season. The primary goal of the final phase of this project is to separate out the effects of trapping and timber harvesting on marten populations. A follow-up project, to the original 10 year study, began this year. For this study, one of Dr. Harrison's graduate students, Angela Fuller, is investigating the influence of partial harvest timber management (widely used in Maine) on marten behavior and habitat use.

As part of the Department's strategic planning process, species assessments for furbearers will be revised and updated starting this year. The first furbearer populations to be assessed will be coyote and raccoon. These assessments will be followed next year by ones for beaver and otter, and the remaining assessments will be written by 2001. These assessments are a compilation of



the best information available on the status and biological needs of wildlife species in Maine. They are a key element in the formulation of our strategic management plans and are formally reviewed by the public.

An integral part of furbearer management is explaining to the general public the role of trappers in today's society. During the past few years, we have worked with wildlife agencies from other states, trapping organizations, and the U.S. Fish & Wildlife Service in putting together educational materials for the general public on trapping. This year we were able to distribute two of the products of this endeavor: a booklet entitled, "Trapping and furbearer management: perspectives from the Northeast" and a video, "Balancing nature trapping in today's world." With the help of various members of the Maine Trapper's Association, we placed the trapping education booklet in many of the state's school districts. This booklet will also be incorporated into Maine's trapper education program. If you would like a copy of the this booklet or video for your organization, please contact the Mammal Group Leader at the Bangor MDIF&W office. In the future, we hope to be working with the International Association of Fish and Wildlife Agencies and the Maine Trappers Association on formulating and implementing Best Management Practices for trapping in Maine.

—Walter Jakubas



MOOSE

1996 Season

In 1996, 1,500 moose hunting permits were issued for 6 zones in northern Maine. One hundred more permits were issued this year than last year, completely using the 1,500 permits allotted by the state legislature. This was the highest number of hunters who have participated in the moose season since it reopened in 1980. The 6 day season began on October 7th.

Hunters continued to have high success (Table 6). Ninety-two percent of the 1,384 hunting parties killed a moose. Over 95% of the hunters tagged a moose in the northeast (NE), south central (SC), and southwest (SW) zones.

Table 6. Success rate (% permits filled) of Maine moose hunters by zone and year.

Season	Moose Hunt Zone						ALL
	NW	NE	CE	SE	SC	SW	
1980 (9/22-27)	No zones						91
1982 (9/20-25)	Not registered by zones						88
1983 (9/19-24)	57	66	78	65	95	92	77
1984 (10/8-13)	67	78	82	83	94	91	82
1985 (10/21-26)	73	86	89	86	98	98	88
1986 ¹ 10/20-25)	65	85	90	72	100	91	86
1987 (10/18-23)	64	90	96	78	98	98	89
1988 (10/17-22)	84	93	92	82	98	100	93
1989 (10/16-21)	82	95	93	85	99	97	92
1990 (9/24-29)	74	88	93	75	97	98	88
1991 (10/7-12)	90	99	97	89	99	98	96
1992 (10/5-10)	78	93	94	79	98	96	91
1993 (10/4-9)	80	95	96	85	98	99	93
1994 (10/3-8)	85	96	95	88	98	98	94
1995 (10/2-7)	78	94	93	88	98	99	93
1996 (10/7-12)	76	96	93	87	100	96	92

¹Area open to hunting expanded in three southern zones.

Hunters from the central (CE) Zone had a 93% success rate, while hunters from the southeast (SE) and northwest (NW) had success rates of 87% and 76%, respectively.

As in the past, hunters were very selective. The registered kill was 76% bulls, 23% cows and 1% calves (Table 7). Although the proportion of males in the harvest remained high, hunters reported seeing fewer bulls per cow in some zones. This suggests that the sex ratio in the field has been altered in favor of cows in these areas (Figure 4). Although the decline in bulls seen will have little impact on moose population growth, a decline in mature bull numbers could reduce the satisfaction of hunters and moose watchers. Although

Table 7. 1996 Registered Moose Kill by Zone and Sex.

Sex	CE	NE	NW	SC	SE	SW	Total
Female	80	63	32	42	46	68	331
Male	235	194	82	109	154	276	1,050
Unrecorded	0	1	0	2	0	0	3
Total	315	258	114	153	200	344	1,384

hunters reported seeing a lower proportion of bulls with palmate antlers in the SW and SC zones, the total number of palmate bulls seen was high because of higher overall moose numbers (Figure 5).

Prospects for 1997 Season

In 1997, 1,500 permits will be issued; however, 80 of those permits will be issued for the new southern (S) zone. Permit numbers will be decreased by 20 in the C and SW zones and by 10 in the other zones. The new zone is about 2,100 mi² and is located south of the current SW zone (Figure 6).

The number of moose killed per square mile in the new S zone will be low. Even if all permittees kill a moose, less than 4 moose/100 mi² will be harvested from this zone. The low density of hunters in the S zone should reduce potential for conflict with other recreational activities, and not affect moose viewing opportunities. For comparison, the area in New Hampshire adjacent to Maine's new S zone, had a kill density of 10 moose/100 mi², or more than twice the kill density expected for the new zone. In Maine, kill densities

Figure 4. Percent male moose over one year of age seen and killed during the 1996 season.

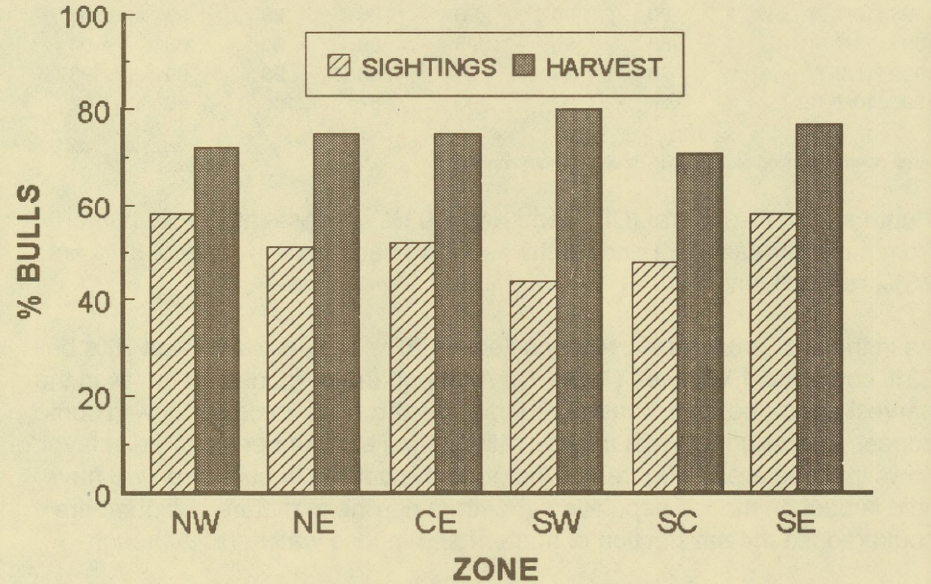
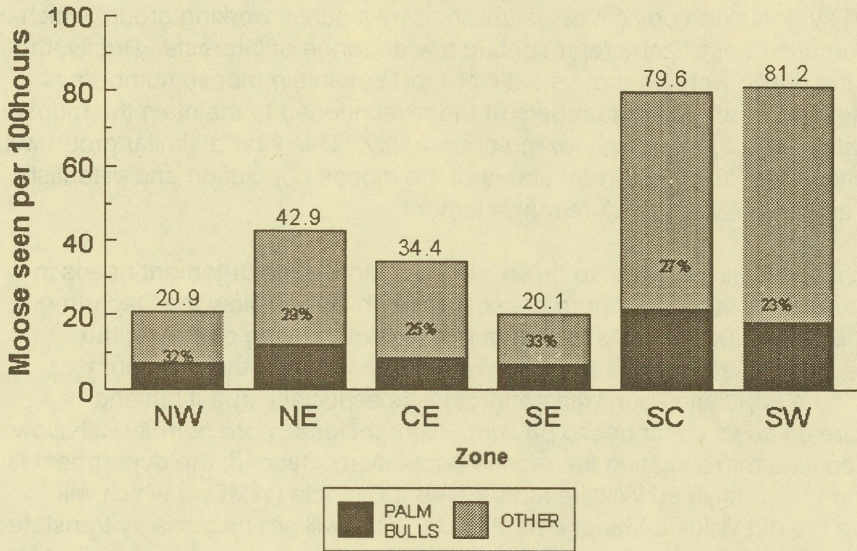


Figure 5. Moose seen per 100 hours spent moose hunting in 1996.



ranged from 5 moose/100 mi² for the SE zone to 11 for the SW zone, in 1996. Historically, the average has been from 3/100 mi² in the SE zone to 9/100 mi² in the CE zone. In all, we expect the moose harvest in the new zone to have little impact on the number of moose in the zone, especially if hunters continue to select bulls and leave adult cows to continue producing calves.

**1997
MOOSE PERMIT
ALLOCATIONS
BY ZONE**

Hunting permits will be allocated to the following seven zones (total number of permits follows in parentheses).

NE	Northeastern Zone (260)
NW	Northwestern Zone (140)
C	Central Zone (320)
SE	Southeast Zone (220)
SC	Southcentral Zone (140)
SW	Southwestern Zone (340)
S	South Zone (80)

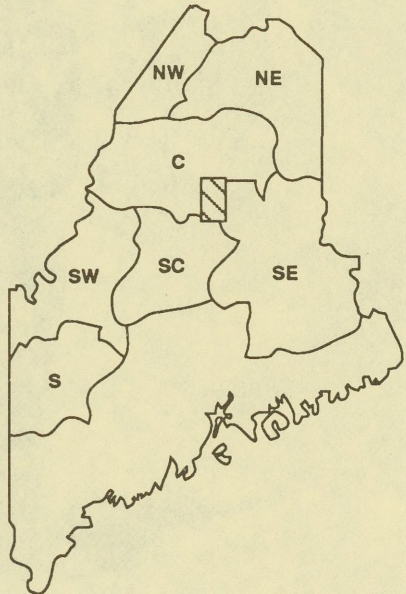


Figure 6. Maine moose hunting zones, 1997.

Future changes

How we manage moose may change in the future. Since 1985, we have been guided by goals and objectives established by a public working group, which was comprised of citizens representing a wide range of interests. Briefly, the goals the public working groups set were to 1) maintain moose numbers at 1985 levels, 2) set permit numbers at the level needed to maintain the moose population, and 3) maintain viewing opportunity. This year a similar group will be invited to review the current status of the moose population and establish goals and objectives for future management.

Two changes will permit us to better address moose management needs in the future. First, the legislature passed a bill which will allow the Department to issue up to 2,000 permits. Even at this level of hunting pressure, the moose harvest is expected to be conservative relative to the maximum harvest the population can withstand. This is especially true if hunting pressure on cows continues to be light. Nonetheless, more permits will allow more options for regulating the moose population. Second, the department is seeking to establish 30 Wildlife Management Districts (WMDs), which will replace the old Wildlife Management Units. This will not necessarily translate into 30 moose hunting zones. Adjacent WMDs, with similar access and goals, will be combined to form moose zones.

—Karen Morris



WHITE-TAILED DEER

Maine's approach to deer management

White-tailed deer are a high-profile species in Maine. Nearly all of our citizens enjoy seeing wild deer in their native habitat. In addition, more than 200,000 Mainers and visitors annually pursue recreational hunting of Maine white-tails. Deer hunters annually contribute more than \$100 million to Maine's economy, while spending more than 2 million days afield in the Maine woods.

White-tailed deer have evolved under intense predation pressures. Among their many adaptations to predation is a high reproductive rate. Deer are adapted to quickly replace losses to the population, particularly when high quality food is available. In areas where predators are scarce or absent, deer quickly multiply, often to levels where they damage native and cultivated vegetation. Over-abundant deer populations often conflict with land-owners, due to excessive browsing damage to ornamental plantings, agricultural crops, and forest regeneration, and due to property damage and personal injury from collisions with motor vehicles. Excessive deer populations may also increase risk of Lyme Disease to humans. In every location, there is a point in deer abundance where deer cease to be viewed by society as a natural asset, but rather as a nuisance and a liability.

The Department of Inland Fisheries and Wildlife (DIF&W) considers man to be a legitimate and natural predator of white-tailed deer in today's environment. As such, recreational hunting is an extension of the inter-relationships which had long existed between North America's earliest human inhabitants and white-tailed deer. To be sure, modern recreational hunting is highly regulated to ensure deer populations remain at healthy levels, and to ensure deer are pursued safely and under strict rules of fair chase. In this context, we view recreational deer hunting as both a priority recreational opportunity and as our most practical means of maintaining Maine's deer populations at optimum levels.

Today, most areas in Maine where deer populations are considered excessive are those which limit access to recreational hunting. Barriers to hunter access include posted land, areas where firearm discharge is prohibited, or areas which are closed to all hunting. Our agency is actively pursuing landowner initiatives, designed to increase hunter access, as well as innovative approaches to hunting deer in areas where traditional means of recreational hunting are restricted.

Maine is a large and diverse state. Not surprisingly, there are wide variations in the capability of existing habitat to support deer. In order to provide the best deer population management possible, we manage deer on a regional level. Since 1986, we have managed deer within 18 Deer Management Districts (DMDs), each averaging about 1,500 of Maine's nearly 30,000 square miles of

deer habitat (Figure 7). Our 10+ years of experience in regional deer management was a good first step toward maximizing deer habitat potential—but we can do much better. Beginning in 1998, we intend to change to a 30-district system (Figure 8). This new grouping will feature smaller (1,000 square miles) areas called Wildlife Management Districts (WMDs); these WMDs will be the new units with which we will regulate the harvest of all our hunted species. One major benefit to deer hunters will be expanded hunting opportunity (e.g., more Any-Deer permits, and special hunting seasons). Using the WMD system, hunters and trappers should experience less confusion in learning district boundaries. Currently, we have different boundaries for deer, moose, furbearers, grouse, turkey, and waterfowl hunting zones. When WMDs are implemented, all of these seasons will be regulated using common boundaries for hunting zones.

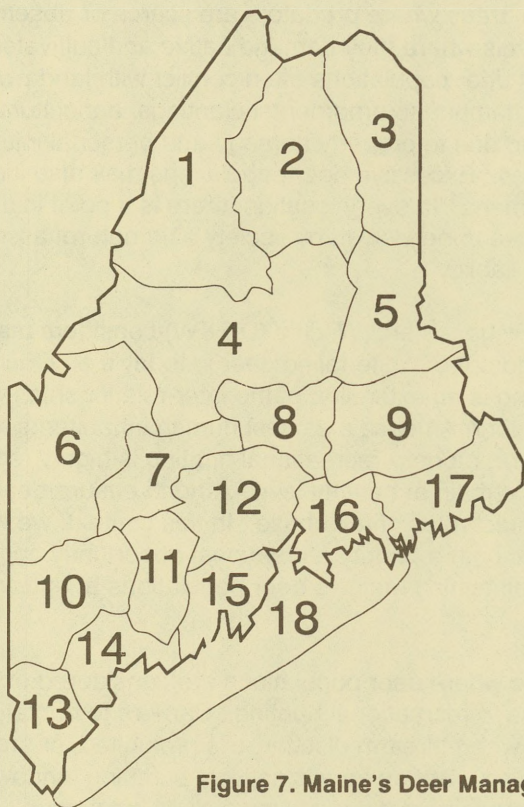


Figure 7. Maine's Deer Management Districts.

Deciding what is an appropriate deer population for each unit of land in Maine is no easy matter. We must consider not only the capability of the land to support deer, but also how well the people, who must share that habitat with deer, tolerate negative interactions with white-tails (vegetation damage, vehicle collisions, Lyme Disease, etc.). Since 1975, DIF&W has used strategic planning to guide population management of deer (and most other hunted species, as well as a few endangered species) in Maine. Once each

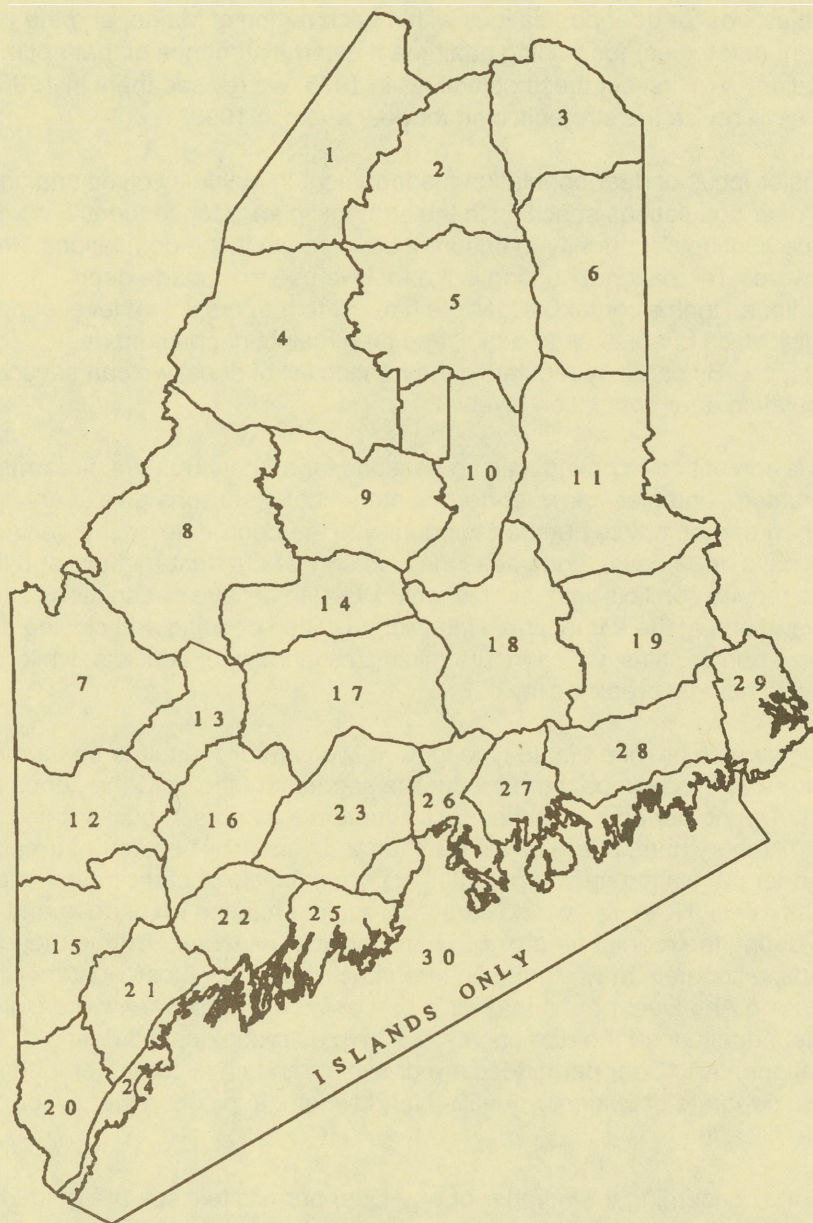


Figure 8. Proposed Wildlife Management Districts (WMDs).

15 years or less, we convene public working groups comprising representatives from major segments of the public who are affected by deer. Examples include: representatives of large and small landowners, farmers, hunters, outfitters, and the non-hunting public. Typically, we review biological potentials for deer population in each area, and then attempt to reach a consensus as to what level of deer abundance is socially optimum within a given DMD. The end products of strategic planning are a clear set of goals

and objectives for deer populations within each region of Maine, and the blueprint (strategies) for guiding attainment and maintenance of that optimum population. We first set these objectives in 1975; we revised them in 1986, and we will revise the strategic plan for deer again in 1998.

The major focus of deer population management in Maine involves attainment of the deer populations specified in the strategic plan. Consequently, we regulate hunting opportunity to ensure that we reach those populations. In other words, recreational hunting is the tool we use to manage deer populations. In this context, allowable harvest to hunters is that level of deer mortality which enables us to attain, and then maintain, optimum deer abundance. By carefully regulating the hunting kill of does, we can succeed in manipulating deer population levels.

IF&W is committed to providing long seasons for archery hunters, firearms deer hunters, and black powder deer hunters. Long seasons give every hunter an opportunity to pursue their quarry to the degree he or she desires, be it 2 days or 62 days. Long seasons also spread out hunter effort, and they tend to reduce conflicts with landowners. We also believe our seasons should begin and end at the same time, statewide. Unified opening and closing dates minimize hunter shifts, which in turn minimizes landowner conflicts, while improving harvest predictability.

Although we do provide ample time to hunt, we carefully regulate the number of hunters who may impact the productive segment of the herd (i.e., does and fawns). During our archery seasons, all hunters may pursue bucks, does, and fawns. Archery hunters are few in number and their activities do not greatly affect deer population growth potential at current levels of participation and success rates. However, we do carefully regulate hunting kill of does and fawns during the regular firearm and black powder seasons. During these seasons, all hunters may pursue antlered bucks, but only those hunters who possess an Any-Deer permit may kill a doe or fawn. In this way, we ensure that the magnitude of the doe harvest will help us reach desired deer populations. Any-Deer permittees are drawn at random in computer lotteries, first in a separate drawing for qualified landowners, and subsequently for all other applicants.

Decisions concerning the number of Any-Deer permits to issue are guided by our Deer Management System. Department biologists use biologically-driven guidelines to arrive at the number of Any-Deer permits to be issued. As with population goals, we recommend Any-Deer permits for each individual DMD (Figure 7). Each spring we review what progress has been made toward reaching population objectives, and we evaluate the effects of winter mortality, our past management practices, and other factors on each regional herd. Our Deer Management System enables us to objectively recommend appropriate doe harvest levels (quotas), and to determine the number of Any-Deer permits necessary to achieve these doe quotas. In this way, we annually assure

hunters and the public that deer populations are being managed for maximum public benefits, as detailed in the Strategic Deer Plan.

White-tailed deer are near the northern limit of their range in Maine. Severe winters can decimate deer populations, but the availability of quality wintering habitat can blunt the effects of harsh wintering conditions. Our deer require high-quality wintering habitat if we are to attain the deer population people find most desirable. While it is true that the severity of winter weather decreases from the north woods to the southern coast in Maine, deer nearly everywhere in Maine depend on wintering habitat for survival during a portion of nearly every winter. Maintenance of optimum populations of deer in Maine requires roughly 1.5 million acres of wintering habitat (Maine has nearly 20 million acres of forest). During the past 25 years, DIF&W has actively pursued deer wintering area programs designed to protect and enhance the most vulnerable components of this habitat base. We are currently using both regulatory and cooperative approaches with landowners to ensure that deer wintering habitat will remain available well into the future.

1996 Deer Harvest

Season Dates and Structure

Maine's deer hunters could pursue white-tailed deer for 63 days within three separate hunting seasons during 1996. During the archery season (26 days, October 3 - November 1), archers could hunt deer of either sex. The regular firearm season, which began for residents on November 2 and for all hunters on the following Monday (November 4), ended on November 30 (25 hunting days). Black powder enthusiasts had 6 days (December 2 - 7) to hunt white-tails in northern, western, and eastern DMDs (Figure 7). Elsewhere, the muzzleloader season spanned a total of 12 days (December 2 - 14). Regardless of season, deer could not be hunted on Sundays, and the limit on deer was one per hunter. During the regular firearm and muzzleloader seasons, hunters could harvest a buck (a deer with antlers three or more inches in length) anywhere in Maine. Those who drew an Any-Deer permit could choose to take a doe or a fawn instead, but only in the DMD specified on the permit. **Use of an Any-Deer permit by any hunter other than the one who drew that permit is a violation of the law!**

Doe Quotas, Any-Deer Permits, and Applicants

Doe quotas for the 1996 deer seasons in Maine were set at levels which would facilitate slow herd growth in each DMD. Generally, high winter survival and above-average fawn rearing success occur when mild winters prevail. This, in turn, enables us to accommodate higher doe and fawn harvests, while still achieving population increases. However, when severe winters occur, we must reduce hunter kills of does to begin re-building the herd.

During 1996, mild winters prevailed in 16 of our 18 DMDs, including our northernmost 3 DMDs (Figure 7). As a result, harvest quotas increased in many DMDs, and they ranged from 15 adult does (expected archery kill) for DMD 17 to 1,305 does for DMD 12. When summed for our 18 DMDs, doe quotas totaled 6,101 does older than fawn during 1996, or about 1,000 more does than were desired in the harvest during 1995. If we had achieved this year's quota of adult does, Any-Deer permit holders and archers would also have tagged approximately 3,650 fawns (buck and doe combined) during 1996.

Generally, 4 to 8 Any-Deer permits must be issued to achieve a registered harvest of one adult doe. This is so because some Any-Deer permittees may choose to take a buck or a fawn instead, while a great many others are not successful in killing any deer. The number of Any-Deer permits we allocate in a given district reflects the number of does we desire in the harvest. Consequently, DMDs that can sustain only limited doe mortality (e.g., northern, western, eastern DMDs) are allocated relatively few Any-Deer permits. In contrast, DMDs which can support higher doe mortality (and still grow in herd size) are allocated considerably more Any-Deer permits (central, southern and coastal DMDs).

During 1996, Any-Deer permit allocations ranged from 106 in DMD 9 to 8,587 permits in DMD 12. On a per square mile basis, the top 5 DMDs allocated Any-Deer permits during 1996 were DMD 14 (583 per 100 square miles, DMD 12 (458), DMD 13 (434), DMD 11 (383), and DMD 15 (272 Any-Deer permits per 100 square miles). Statewide, we issued 34,492 Any-Deer permits, or 15% more than were issued in 1995 (29,886 permits). This year, DMD 17 was the only district in which no Any-Deer permits were allocated.

During 1996, 97,792 applicants vied, at no cost, for a chance to draw one of 34,492 Any-Deer permits. Of these, 88% (86,074 applicants) were Maine residents. Among the 11,718 nonresident applicants were individuals who reside in 43 states and 5 Canadian provinces. In keeping with our landowner recognition program, 6,128 (18%) of the 34,492 total Any-Deer permits were issued to qualifying landowners (people who own 25 or more acres of land in Maine, which is kept open to hunting). Maine residents were issued 30,408 (88%) Any-Deer permits while nonresidents received 4,084 permits (12% of total). It is worth noting that only about one-half of our resident deer hunters, and less than 45% of our nonresident hunters, apply for an Any-Deer permit each year.

Statewide Statistics

Overall, 28,375 deer were registered during 1996, of which 774, 27,278, and 323 were taken during the archery, regular firearm, and muzzleloader seasons, respectively (Table 8). Relative to 1995 (27,384 deer), Maine's deer take increased by nearly 4% (991 deer) in 1996, and it ranks 37th highest among the 78 years for which deer harvest records are available (1919 to

Table 8. Sex and age composition of the 1996 deer harvest, by season type and week of the regular firearm season, statewide¹.

Season	Sex/Age Class				Total		Percent by Week		
	Adult		Fawn		Total Deer	Antlerless Deer	Adult		
	Buck	Doe	Buck	Doe			Total	Buck	Antlerless
Special Archery	359	279	67	69	774	415	3	2	5
Reg. Firearm	19,089	5,449	1,465	1,275	27,278	8,189	96	97	93
Open Sat	2,495	589	178	143	3,405	910	12	13	10
November 4 - 9	4,472	999	313	275	6,059	1,587	21	23	18
November 11 - 16	4,699	1,059	312	236	6,306	1,607	22	24	18
November 18 - 23	3,631	832	211	183	4,857	1,226	17	19	14
November 25 - 30	3,792	1,970	451	438	6,651	2,859	23	19	33
Spec. Muzz.	163	108	29	23	323	160	1	1	2
December 2 - 7	72	39	7	7	125	53	<1	<1	1
December 9 - 14	91	69	22	16	198	107	<1	<1	1
Total	19,611	5,836	1,561	1,367	28,375	8,764	100	100	100

¹Sex/age data were corrected for errors in the deer registrations.

1996). Among seasons, deer harvest increased slightly (1,568 deer, mostly adult bucks) during the regular firearm season (+6%) in 1996 compared to the previous year (25,710). In contrast, deer harvest declined markedly during the archery (-33%) and muzzleloader (-38%) seasons in 1996 relative to 1995 (1,151 and 523 deer, respectively). The drop in harvest during these two primitive weapon deer seasons is not attributable to decreases in hunter effort or deer population. Rather, between-year differences in hunting conditions are a more likely explanation. During 1995, dry weather, and a lack of mast, concentrated deer in October, while early snows afforded excellent tracking conditions in late November-early December. Both factors led to harvests which were well above norms for the archery and black powder seasons, respectively. Deer harvests during these special seasons actually returned to normal levels during 1996.

Buck Harvest

Given stable season length, and average or normal levels of hunting pressure and hunting conditions, the size of the antlered buck harvest reflects the size of the deer herd as a whole. Because of this, trends in the buck harvest tell us much about regional and annual differences in deer populations. Based on buck harvest trends, deer populations have been increasing in Maine, particularly during the past 2 years. Conservative harvests of does since 1983, combined with recent favorable winters, have enabled us to achieve significant gains in deer numbers wherever adequate wintering habitat exists.

The 19,611 antlered bucks taken in 1996 set an all-time record for Maine. Maine's two previous highest buck harvests occurred in 1956 (18,655) and 1958 (18,239). During the recent 2 years, buck harvests have increased by

13% and 9% annually. As the deer herd has grown during the past 15 years, so too has the buck harvest. Hunters now tag more than one-third more bucks than they were able to tag back in the either-sex hunting era. For example, the average buck harvest for 1992-96 tallied 17,431 antlered bucks, while the buck take for the final 5 years of either-sex hunting (1978-82) averaged only 12,813 bucks. Since the late 1970's, hunter numbers have not changed appreciably, but the autumn population of deer has increased by more than 75% (more on this later).

Among the 19,611 antlered bucks taken statewide, roughly 8,050 (41%) were yearlings sporting their first set of antlers, while more than 4,100 (20%) were mature bucks $4\frac{1}{2}$ to $15\frac{1}{2}$ years of age. Button bucks (male fawns) are not included here. They are reported as antlerless deer since their velvet-covered nubbins (pedicles) never attain legal length (3"). Incidentally, the trend in motor vehicle collisions with deer has paralleled trends in buck harvest, providing additional evidence that Maine's deer herd increased since the early 1980s.

Maine is nationally known for producing trophy bucks (age $4\frac{1}{2}$ and older). This is possible because, unlike the situation in many other states, Maine's bucks are subjected to relatively light hunting pressure. In our state, a healthy number of bucks annually survives to the older (mature) age classes. In more heavily hunted states, yearling bucks comprise as much as 70 to 90% of the bucks available, and in those states, bucks rarely survive beyond $3\frac{1}{2}$ years! A cautionary note: Maine's bucks also are vulnerable to increasing hunting effort. There is already a substantial difference in availability of trophy bucks in heavily hunted southern Maine vs. lightly hunted northern Maine. Increases in any combination of hunter numbers, season length, or effort per hunter (which increases total hunting pressure on the herd) anywhere in Maine will inevitably reduce the number of older bucks in the herd.

Antlerless Deer Harvest

The magnitude of Maine's harvest of does and fawns depends on the success rate of archers and the number of Any-Deer permits issued to firearms deer hunters. The statewide harvest of adult does ($1\frac{1}{2}$ years and older) during 1996 was 5,836, or 265 does (-4%) below the pre-set quota (6,101 does). Most of the (small) difference between the doe harvest and the pre-season quota is attributable to the outcome of the archery season in October. Archers tagged 183 fewer adult does in 1996 (279 does) than during 1995 (462 does). When we set quotas for doe harvest in spring 1996, we expected archers would contribute at least as many does to total harvest in 1996 as they did the previous year.

During 1996, we noted a higher percentage of Any-Deer permittees were tagging antlered bucks instead of does or fawns. This would be an expected response among hunters who are encountering more deer as the herd continues to grow. In addition to adult does, Any-Deer permittees tagged

2,792 fawns, while archers tagged 136 young of the year in 1996. Overall, 8,764 antlerless deer were registered by Maine's deer hunters during 1996.

Doe harvests among DMDs varied with the number of Any-Deer Permits issued. The fewest does were tagged in DMD 17 (14 does, all by archery), where no Any-Deer permits were issued (Table 9). In contrast, DMD 12 holds the record for most does tagged (1,329, including 54 does taken by archers), as well as the most Any-Deer permits issued (8,587 permits). In all DMDs, doe and fawn harvests remained at levels which would facilitate continued herd growth. In 1996, we continued to maintain overall doe harvests which are about one-half the magnitude of the 1970's, when doe harvests were not closely regulated, and the statewide herd was declining.

Harvest by Week

The four-week archery season and the two-week black powder season together accounted for only 4% of the registered harvest of deer in Maine during 1996 (Table 8). This parallels the long-term trend in contribution of the primitive weapon seasons to the overall harvest typically seen in the recent past. During the regular firearm season, harvest distribution was fairly uniform after opening day. During the opening Saturday for residents, hunting pressure was relatively intense; 12% of the total deer kill occurred on this one day. Firearm deer harvest during the first three weeks was rather stable, with each week accounting for 17 to 22% of the total harvest. There was, however, a minor surge in deer harvest during the final week of the firearm season (Table 8). This was particularly evident for antlerless deer, as hunters increased efforts to "cash in" on their Any-Deer permits during the Thanksgiving holiday and weekend. The availability of tracking snow in many parts of the state did not contribute as much to deer harvest rate during 1996 as it did the previous year.

Harvest by DMD

As noted earlier, differences in doe and fawn harvests among our 18 DMDs (Table 9) largely stemmed from the relative number of Any-Deer permits issued. Although harvests of antlered bucks are influenced to some degree by regional and annual differences in hunting pressure and hunting weather, the size of the buck harvest roughly reflects the relative abundance of deer among the DMDs.

Typically, highest density of buck kills occurs in central and southern DMDs (Figure 7). During 1996, DMD 11 led the state in buck harvest density, with 178 bucks harvested per 100 square miles of habitat. At the other end of the scale, northern and eastern DMDs supported the lowest buck harvests (and generally lower overall deer populations). DMD 3, encompassing NE Aroostook Co. (Figure 7), supported the lowest harvest density of bucks (18 bucks per 100 square miles) among Maine's 18 DMDs. During 1996, the registered kill of bucks averaged 67 antlered bucks per 100 square miles, statewide. During the past 5 years, DMDs supporting highest buck harvest

Table 9. Sex and age composition of the 1996 deer harvest in Maine by Deer Management District (DMD)¹.

DMD	Sex/Age Class				Total Deer	Total	Adult Does	Antlerless	Kill Per
	Adult		Fawn			Antlerless	Per 100	Deer/100	Sq. MI
	Buck	Doe	Buck	Doe		Deer	Ad. Bucks	Ad. Bucks	Habitat
1	985	91	28	20	1,124	139	9	14	.27
2	778	69	16	14	877	99	9	13	.29
3	420	39	10	7	476	56	9	13	.21
4	1,250	187	48	34	1,519	269	15	22	.43
5	759	130	39	27	955	196	17	26	.54
6	963	117	31	22	1,133	170	12	18	.45
7	1,083	375	82	75	1,615	532	35	49	1.93
8	1,178	396	108	97	1,779	601	34	51	1.80
9	488	33	12	8	541	53	7	11	.30
10	1,675	676	180	168	2,699	1,024	40	61	1.72
11	1,379	522	117	108	2,126	747	38	54	2.74
12	3,218	1,329	363	323	5,233	2,015	41	63	2.79
13	1,322	645	182	166	2,315	993	49	75	2.33
14	1,176	544	179	143	2,042	866	46	74	3.01
15	1,487	472	103	91	2,153	666	32	45	2.12
16	834	102	29	26	991	157	12	19	1.29
17	448	14	7	2	471	23	3	5	.27
18²	168	95	27	36	326	158	57	94	NA²
State	19,611	5,836	1,561	1,367	28,375	8,764	30	45	.96

¹Sex/age data were corrected for errors in the deer registrations.
²Area of deer habitat in DMD 18 has not been determined.

densities (and therefore highest overall deer populations) were, in decreasing order: DMDs 11, 12, 14, 15 and 7.

Harvest by Hunter Residency

Maine residents claimed the lion's share (83%) of the deer harvest in 1996 (Table 10). Among seasons, the proportion of deer harvest registered by Maine residents was highest for the black powder season (95% residents), followed by the archery (91%), and regular firearm (83% residents) seasons. As has occurred during the past several decades, nonresidents tagged about one deer in five, while accounting for less than one of every six deer hunting licenses sold.

Regional differences occurred in the distribution of the harvest by residents and visitors to Maine. In the more populous central and southern DMDs (Figure 7), most successful deer hunters were residents. However, in the largely unpopulated "North woods" of Maine, nonresidents accounted for a much larger share of the deer harvest. At one extreme, 60% of the deer harvested in remote, unpopulated DMD 1 were registered by nonresidents

(primarily Canadians from Quebec). At the other end of the spectrum, 98% of the deer killed in heavily populated DMD 14 (primarily Cumberland Co.) were registered by Maine residents (Table 10).

A substantial number of Maine residents typically travel to hunting areas outside their home DMD. Many residents pursue deer within two or more DMDs during the course of Maine's three deer seasons. Typically, one-quarter of the statewide deer harvest is registered by Maine residents who traveled to a DMD away from their home DMD.

Hunter Participation and Success Rate

During 1996, roughly 230,000 licenses which permit deer hunting were sold in Maine; 85% were bought by residents. License sales in 1996 were slightly below sales recorded in 1995 (236,000). Not all hunters who purchase big game hunting licenses actually pursue deer. According to recent (1988) and past surveys (1970 to 1984), about 15% of these license buyers typically chose not to hunt deer. When these non-participants are subtracted from total sales of deer hunting licenses, the estimated number of hunters who actually pursued deer in Maine during 1996 was approximately 196,000. Hunter density, therefore, averaged nearly seven per square mile, statewide, and this hunter force expended an estimated 1.55 million hunter-days effort pursuing

Table 10. Deer registrations by Deer Management District (DMD) and hunter residence, 1996.

DMD	Deer Registered by:				Total 1996	Total 1995	Percent Change
	Residents		Nonresidents				
	Number	Percent	Number	Percent			
1	455	40	669	60	1,124	943	+19
2	441	50	436	50	877	638	+37
3	424	89	52	11	476	305	+56
4	846	56	673	44	1,519	1,615	-6
5	690	72	265	28	955	779	+22
6	734	65	399	35	1,133	1,378	-18
7	1,274	79	341	21	1,615	1,694	-5
8	1,452	82	327	18	1,779	1,781	0
9	447	83	94	17	541	502	+8
10	2,415	89	284	11	2,699	2,939	-8
11	1,999	94	127	6	2,126	2,272	-6
12	4,594	89	639	11	5,233	5,134	+2
13	2,066	89	249	11	2,315	2,135	+8
14	2,014	98	41	2	2,055	1,709	+20
15	2,000	92	171	8	2,171	1,988	+9
16	926	92	76	8	1,002	751	+33
17	453	95	25	5	478	456	+5
18	257	93	20	7	277	365	-24
Statewide	23,487	83	4,888	17	28,375	27,384	+4

deer during our 63-day hunting season. It is worth noting that hunter participation averaged slightly higher during 1989-96 (205,000 hunters) than during 1982-88 (188,000 hunters), i.e., the initial years of doe harvest restrictions under a bucks-only law, and the early years of the Any-Deer permit system.

Hunting pressure varies dramatically between northern and eastern DMDs relative to central and southern DMDs (Figure 7). The more lightly-hunted northern and eastern DMDs accommodate only 3 to 5 hunters per square mile over Maine's 63 day deer seasons; hunters there expend only 8 to 31 hunter-days per square mile of pressure on the deer herd. In central and southern DMDs hunter density ranges from 10 to 18 hunters per square mile over 63 days, and hunting pressure ranges from 80 to nearly 210 hunter-days of pressure per square mile on the herd. Since there is 5 to 10 times as much hunting pressure on central and southern Maine deer populations, hunting there exerts a much greater influence on deer population dynamics than is the case in the north woods.

Among archers, 11,599 residents and 1,211 nonresidents bought licenses which permitted them to hunt deer during the October archery season. The 12,810 archery licenses sold during 1996 represents an -8% decrease below archery license sales in 1995. Since 1983, however, archery license sales have more than tripled, reflecting a strong trend toward greater participation in the sport of bowhunting for deer. In that time, the archery deer harvest has climbed from about 100 to 1,151 deer (1995 harvest).

Compared to the regular firearms season, which attracts at least 190,000 participants, relatively few deer hunters currently participate in Maine's late black powder deer season. Sales of muzzleloading season permits totaled 9,551 during 1996, a 5% increase over 1995 sales (9,129). Undoubtedly, the addition of an extra week to the black powder season has sparked additional participation in this primitive firearm hunt. Muzzleloader license sales increased by 58% when we changed the black powder season from one to two weeks in 1995. Since its inception in 1981, however, the black powder deer season has drawn a steadily increasing number of participants. In its first year (1981), only 415 hunters purchased a muzzleloading permit. The number of deer registered during Maine's muzzleloader season has grown from 7 in 1981 to 523 in 1995. This hunting season is expected to continue to grow in popularity.

Deer hunting success averaged 15%, overall, during 1996. Success rate among nonresidents (18%) was slightly higher than success rate experienced by residents of Maine (14%). Apparent success rate among hunters who drew an Any-Deer permit (35%) was considerably higher than among hunters who were restricted to bucks-only (10%) during the firearms seasons. Any-Deer permittees could harvest either a doe, a fawn or a buck, hence they would be expected to achieve higher success. In addition, though, some hunters

evidently pool their antlerless deer kill with Any-Deer permittees, which is illegal. Success rate among archers (6%), and muzzleloader hunters (4%) remains lower than overall success rate achieved among regular firearms deer season hunters (15%). Overall success rate among deer hunters varies among DMDs (Figure 7), and is influenced by the relative number of Any-Deer permits we issue, as well as relative deer abundance. Success rates in 1996 were lowest in northern Maine DMD 3 (6%); they were above the state average in central Maine DMDs (e.g. 16 to 18% in DMDs 10, 11, 12, 13 and 14). Highest apparent success rate, overall, occurred in coastal island DMD 18 (32%), although the quality of these estimates are poorest for the offshore islands.

Maine's Deer Herd

The Deer Strategic Plan, implemented in 1986, called for increasing deer populations to 50 to 60% of the maximum biological carrying capacity in each DMD. Based on current data, we believe this would amount to a wintering herd of 260,000 to 310,000 deer in Maine (9 to 11 deer per square mile). If anything, however, this population estimate may be an under-estimate of biological carrying capacity, particularly for central and southern sections of Maine.

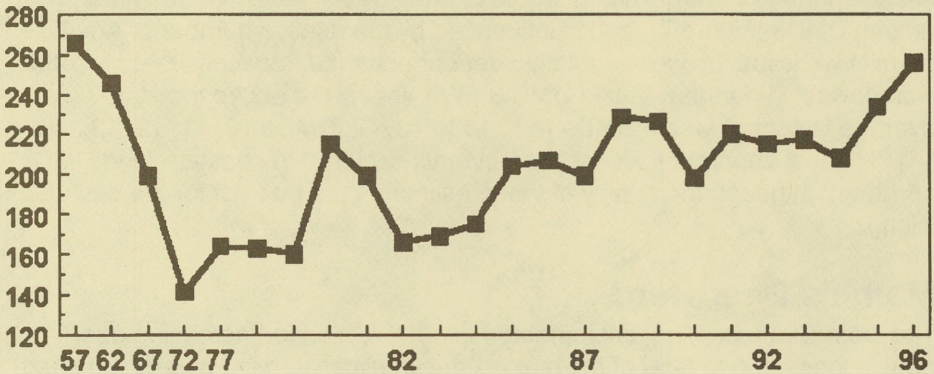
Since 1980, we have been striving to increase deer populations in Maine. Our objective was to reverse a statewide decline in deer numbers which began in the early 1960s (Figure 9). Our primary strategy was to balance doe losses from all causes with available fawn production, by more efficiently regulating the legal harvest of does. We suspected that we would be more successful in achieving herd increases in those DMDs in which 1) hunting was a major mortality factor, 2) wintering habitat was adequate to accommodate higher deer populations, and 3) severe winters were infrequent.

During the past 15 years, Maine's wintering herd has increased from a mean of 160,000 to more than 255,000 deer (Figure 9). During the past 3 years alone, our wintering herd has increased from roughly 208,000 to its current maximum of 255,000 deer. During the past 3 years, we restricted availability of Any-Deer permits in most central and southern Maine DMDs to a much greater degree than we had done during the 10 previous years. These harvest restrictions, combined with high deer survival during recent very mild winters, provided the impetus for very strong herd growth (averaging 15% per year) during 1995 and 1996.

Within individual DMDs, wintering populations now range from as low as 2 deer per square mile in DMD 3 to about 25 per square mile in DMD 12 (Figure 7). Generally, northern and eastern DMDs currently average less than 8 deer per square mile, while central and southern DMDs range between 15 and 25 deer per square mile. Several locations within DMDs 13, 14 and 18, in which hunting access is severely restricted or denied, currently carry populations of 50 to more than 100 deer per square mile. These populations are far in

Figure 9. Maine's statewide wintering deer population.

Number of Deer (x 1000)



* Based on the HARPOP model. 57 is 1955-57; 62 is 1958-62; 67 is 1963-67; 72 is 1968-72; 77 is 1973-77. Remainder are individual years.

excess of 60% of biological carrying capacity, and we more frequently receive complaints of excessive browsing, road kills, and Lyme Disease risk in these areas than elsewhere.

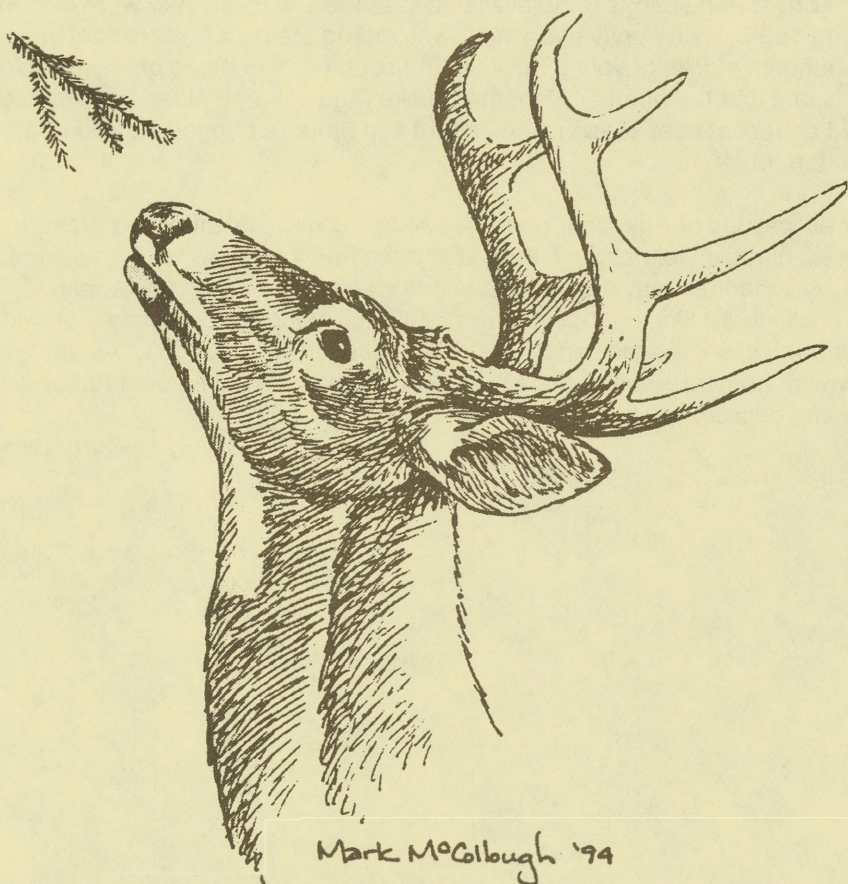
For central and southern Maine DMDs, a density of 25 deer per square mile may not yet represent 50% of maximum biological carrying capacity. Browsing pressure and landowner conflicts with deer do increase dramatically at densities higher than 25 deer per square mile. Therefore, when the Deer Strategic Plan is next updated (1998), we will explore other options in addition to managing for 50 to 60% of biological carrying capacity in central and southern Maine DMDs.

Within northern and eastern DMDs, the harvest restrictions we implemented during the past 15 years has helped to stabilize a declining herd, but we have made little progress toward significantly increasing these deer populations. In these DMDs, the summer range far exceeds the ability of the winter range to support deer. The long-term prescription here is to increase the quantity and quality of wintering habitat available to local deer herds. We are actively pursuing that approach, as noted earlier. In the interim, doe harvest opportunity may remain limited, as we strive to balance what are typically large and frequent winter losses, against the variable fawn production which annually must replace losses among deer in northern and eastern Maine. Over time, as the winter range situation improves, deer populations and harvest opportunities should both increase above current levels in Maine's industrial timberland.

Prospects for the 1997 Deer Season

The Maine Legislature approved a new deer season for 1997 and 1998. It will be an archery season to be held from September 6-30 within coastal portions of DMDs 13 and 14, in addition to the islands comprising DMD 18 (Figure 7). Participants must purchase a separate archery license for this hunt; they will be allowed one deer of either sex separate from the limit for the other three deer seasons. The purpose of this hunt is to encourage additional hunting opportunity and deer harvest in locations where access to firearms hunters is limited. We intend to expand this archery season to other qualifying areas in 1998.

The other three deer seasons will remain similar in structure to 1996. The regular archery season will span October 2-31. The regular firearm season will again be tied to the Thanksgiving holiday (November 27). Hence, opening Saturday for residents only will be November 1; all hunters may pursue deer from November 3 through November 29. The muzzleloader season will begin in all DMDs on December 1, but will end on December 6 in DMDs 1, 2, 3, 4, 5,



6, 9, 16, and 17, or on December 13 in DMDs 7, 8, 10, 11, 12, 13, 14, 15 and 18 (Figure 7).

During 1997, we will issue roughly 41,700 Any-Deer permits (7,200 more than a year ago) to be allocated among 14 of our 18 DMDs (Figure 7). District 17 will remain bucks-only again in 1997, for the 15th consecutive year. Districts 1, 2, and 3 returned to bucks-only status this year, due to severe wintering conditions during 1997. Availability of Any-Deer permits in DMDs 4 and 6 remain curtailed because of above-average winter severity, as well. Within most central and southern DMDs, we were able to expand availability of Any-Deer permits, in part, because winter severity in these regions of the state was milder than average in 1997. In addition, expanding deer herds in Maine's more productive deer habitat enable us to increase doe harvests while still fostering continued herd growth.

Hunters will likely note fewer deer sightings in northern DMDs during 1997. Severe winters there took a toll on the herd. We anticipate a modest decline in buck harvest in DMDs 1 through 6. Elsewhere in Maine, we anticipate higher deer populations to be available to hunters in 1997 than were evident during 1996. High survival among fawns during the past 3 years should result in abundant stocks of young bucks in the southern two-thirds of Maine. We anticipate that the number of mature bucks (age 4½ and older) to remain as good as recent past seasons, i.e., about 1 in 5 bucks bagged statewide will be a mature buck.

Our allocations of Any-Deer permits, combined with the either-sex archery harvest, should yield about 6,800 adult does and 4,100 fawns (both sexes). The buck harvest may exceed last year's all-time record of 19,611, although the buck kill will likely remain below 20,000 this year. Over-all, the statewide deer harvest should exceed 30,500 for the first time since 1981. As always, however, hunting weather this fall will affect our achieved harvest (up or down) to some degree.

—Gerry Lavigne

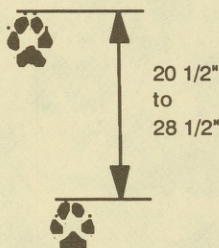
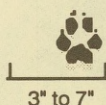


Differences between coyotes, wolves, and dogs

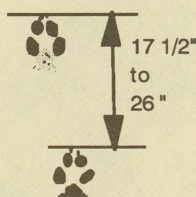
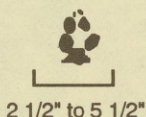
To determine whether an animal is a coyote or wolf, measure its total length (Tip of nose to tip of tail). An animal over 4 ft. in length *may* be a wolf.

Distinguishing track characteristics

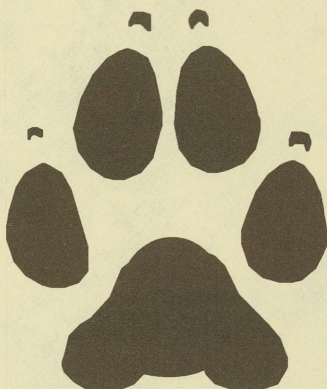
Wolf Track Pattern



Coyote Track Pattern

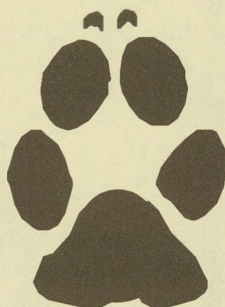


Dog Track Pattern



WOLF PRINT

Length: 3 7/8" to 5 1/2"
Width: 2 3/8" to 5"



COYOTE PRINT

Length: 2 7/8" to 3 1/2"
Width: 1 7/8" to 2 1/2"

OTHER MAMMALS

Wolves

Few wild animals stir our emotions as strongly as wolves — just mention the word “wolves” and you’ll generate a lively discussion anywhere in the state! Although these large predators vanished from Maine nearly a century ago, they are still found in Quebec, within 75 miles of Maine’s northwest border. However, the Saint Lawrence Seaway and surrounding agricultural lands lay between Quebec’s wolves and Maine, forming a barrier to traveling wolves.

Since 1993, two large canids identified as wolves have appeared in Maine, renewing debate over whether wolves are crossing these obstacles. Some Mainers are intrigued by the possibility that wolves may someday return to the State’s forests, either by migrating on their own, or through a man-made reintroduction effort. To others, the prospect of wolves roaming through Maine’s woodlands is horrifying!

Many questions surround the issue of wolves in Maine. Do Mainers want wolves to return to the Pine Tree State? What is the Department’s position on wolves? Are wolves already living in Maine? What are these large cousins to our coyotes really like? Are they dangerous? How would they affect Maine’s wildlife communities, and our use of the forest? Are wolves protected?

Do people want wolves in Maine? We’ll know soon. Public attitudes toward wolves have not been formally assessed, but the Department is planning a mail survey of Maine citizens’ views toward wildlife, including wolves, for late 1997. Elsewhere, public attitudes, including perceptions, tolerance, and interest in wolves, are more important than biological considerations in determining where wolves can exist. Without public support, wolves can not survive in Maine. Until the public’s attitudes are known, we are limiting our efforts to detecting wolves and providing factual information about them.

What is the Department’s position on wolves? We have a responsibility to conserve, enhance, and protect the State’s wildlife resources. With limited budgets and personnel, we have directed most of our programs toward species currently present in the State. Reintroductions of extirpated wildlife, such as wolves, are assigned lower priority; we will only attempt to reestablish these species under a public mandate.

We maintain a database of wolf sightings reported by the public, and are alert for signs of wolves during field activities. Winter snow-track surveys to detect wolf sign have been undertaken since 1994, and we started limited bait and howling surveys in 1997. Large canids trapped or shot and reported to the Department are examined to determine species and origin. Our public education efforts include public press releases and pamphlets describing the physical characteristics of wolves, coyotes, and dogs.

Are wolves already living in Maine? We have searched nearly 2,000 miles of snow transects for signs of wolves, lynx, and mountain lion since 1994-95. A few tracks of large canids have been encountered, but none large enough to provide conclusive evidence of wolves. We've also attempted to photograph large canids with remote-triggered cameras near baits, and try to provoke howling responses, but have been unsuccessful.

Two large canids have been killed in Maine in recent years. The first was a female gray wolf, black in color and weighing 67 pounds. This wolf was shot near Russell Pond north of Moosehead Lake in 1993. Its behavior was suspicious for a wild animal, as it lurked near campgrounds and used a bear bait for several days prior to being shot by a bear hunter. Captive wolves or wolf-dog hybrids are most easily distinguished from wild wolves by their behavior. Released captives are not efficient hunters, and often remain near man's activities for handouts. The second animal was a male trapped in T28 MD in Hancock County in 1996. It was grizzled gray-black on its back with tan flanks and weighed 81.5 pounds. The U.S. Fish and Wildlife Service identified it as either a gray wolf, or wolf-dog hybrid based upon genetic tests and measurements of its skull. Additional information, including its wary behavior prior to capture, diet, and physical condition all suggested that it was of wild origin. Both of these animals were traveling alone when they died.

Gray wolves were extirpated from all of the lower 48 states except Minnesota by the late 1950's, and only recently have begun to expand into other northern states. They are now present in Minnesota, Wisconsin, Michigan, Idaho, Montana, Washington, and Wyoming. Minnesota's wolf population fueled recolonization of parts of Wisconsin and Michigan wolf range, and wolves dispersing from Canada settled in Montana, Idaho, and Washington. The Wyoming population was established by a reintroduction effort lead by the U.S. Fish and Wildlife Service.

Wolves are social meat-eaters. The family unit forms the basis of packs which travel and hunt cooperatively in territories they defend against other wolves. Their social behavior allows wolves to prey on animals larger than they are, and improves survival of their pups. Pups are born in spring, and older siblings help in their feeding and care. Wolves prey primarily on deer throughout much of their North American range, but they also eat moose, caribou, beaver, and smaller animals. Wolves need an abundant prey base, but they adapt to a wide range of cover, from thick forests to open tundra.

Wolves range widely in size, from 50-65 pounds in southeastern Ontario to 150 pounds in northern Canada and Alaska. The wolves of the Laurentides Reserve of Quebec are rather small, ranging from 55 - 105 pounds. Wolves have proportionately longer legs than coyotes, and a longer frame; most wolves in Quebec exceed 56 inches in total length by the time they are a year old. In contrast, Maine coyotes rarely exceed 48-50 inches from tip of nose to tip of tail. Wolves have larger feet than coyotes, and leave tracks that are

rounder in shape (see page 44). Wolf coloration ranges from black to very light beige in color, and many wolves are a grizzled black and gray—similar to Maine's coyotes.

What are wolves like? Are they dangerous? Wolves are large wild dogs. In fact, all domestic dogs have descended from wolves. One of the greatest misconceptions about wolves is their behavior toward humans. There are no records of healthy wolves attacking people. Wolves are quite timid toward man, and normally shy away from areas of human activity. However, conflicts exist. In the past, occasional livestock losses, competition with human hunters for big game such as deer, and public intolerance for predators led to extirpation of wolves over much of North America. Today, good animal husbandry procedures, and removal of offending wolves, are used to minimize conflicts between wolves and man.

How would wolves affect Maine's wildlife? Wolves, like coyotes, can limit populations of prey species, and their presence may require wildlife managers to reduce hunting harvests to maintain the ungulate populations they feed on. We can not accurately predict the impacts wolves would have on Maine's wildlife community, particularly on numbers of deer and moose. However, wolves and their prey species have evolved in natural systems of checks and balances, and the reappearance of wolves has not led to the extirpation of deer and other prey species in the Great Lakes and Western States.

After wolves disappeared from Maine around the turn of the century, Maine had no wild large canid for nearly 50 years. The first coyotes arrived in Maine in the 1930's, but didn't become firmly established until the late 1960's. They have replaced wolves as the top predator in the ecosystem. The public's perceptions of coyotes, and concerns about added mortality to deer and moose populations by wolves, are important issues of discussions on the prospects of returning wolves to the State. Wolves are reported to kill and exclude coyotes from their territories. If wolves returned to Maine, they may displace coyotes from areas they roam instead of adding to the mortality load on prey species.

Are wolves protected? Wolves are protected in Maine under both the Federal Endangered Species Act and State law. Maine's wildlife laws prohibit harassment or killing of any species of wildlife, including wolves, unless an open hunting or trapping season exists. It is also illegal to release wildlife into the wild, and a permit is required to hold wolves in captivity. Released captives usually have low survival, and often die a slow death from starvation. Hunters, trappers, and outdoorsmen and women should use care in identifying any large canids they encounter.

Lynx

This year, the U.S. Fish and Wildlife Service announced that lynx warrant protection under the Federal Endangered Species Act. However, the actual

proposal for listing is on hold due to a backlog of species that are more critical at this time. Under this "warranted but precluded" status, lynx are to be taken into consideration during environmental planning, but do not receive any protection under the Endangered Species Act. Lynx have long been protected in Maine. Currently, lynx are listed as a species of special concern, a status given to them in 1986. Lynx are protected year around from hunting and trapping.

The distribution of lynx in Maine is determined from winter track counts in two separate surveys. Lynx tracks are noted in our annual furbearer track surveys, and in special annual surveys designed for lynx, wolf, and cougar. The furbearer survey began in 1994 and is conducted throughout the northern 3/4 of the state. Approximately 1,200 km of transects are run each year. Lynx tracks have not been observed during any of these track counts.

The special surveys for lynx have been conducted since 1994 in areas historically known to have lynx. Historic records and survey results indicate that there are 3 centers of lynx activity in the state, one north of Moosehead lake, another in the northwest corner of the state, and one in the northeast corner of the state. Since inception, 4,118 km of transects have been searched. Lynx tracks were only found in the winter of 1994-1995, in 9 towns in the northwestern portion of the state.

Part of the state's management program for lynx includes educating the public on the difference between lynx and bobcat (a species that is trapped and hunted). Public awareness of the differences between lynx and bobcat should reduce the number of lynx mistaken for bobcat and harvested incidentally. Lynx descriptions have been included as part of a mailing to trappers since 1991. This upcoming year, a pamphlet describing uncommon canid, cat, and mustelid tracks will be distributed to our Animal Damage Control Cooperators, as part of their training program, and to various chapters of the Maine Trappers Association.

New England Cottontail

Many of Maine's less conspicuous mammals warrant attention because of their rarity, vulnerability, or simply because little is known about their status in Maine. New England cottontails (coonies) fall into this category. New England cottontails originally occurred from southern Maine through the northern Appalachians, but are now rare or absent in most of this area. New England cottontails were reported as far north as Waldo County and Fryeburg in the first half of the century; now they are found only in York and Cumberland counties. The total number of New England cottontails have declined on the east coast not only because of biological reasons, but also because scientists have reclassified the New England cottontail. New England cottontails are now believed to occur only North of the Hudson River, and animals south of the Hudson River are thought to be a different species — the Allegheny cottontail. New England cottontails require brushy habitat, such as overgrown

fields. This kind of habitat was common as farms were abandoned in the Northeast after the turn of the century. Much of this habitat underwent development or matured from brushy communities into forested habitats, which are not as suitable for New England cottontails.

The eastern cottontail, a close relative to the New England cottontail, is much more common and has wide distribution in the United States. The Eastern cottontail appears to be less restricted by specialized habitat requirements and is the most abundant cottontail south of Maine. Eastern cottontails have never been identified in Maine, and some researchers believe that Maine may be the last place where only New England cottontails live.

Bats

Although eight species of bats have been identified in Maine, little is known about the abundance and distribution of any but the little brown myotis and big brown bats that commonly occupy buildings. Over the last 3 summers, we have surveyed bats by using bat detectors, which reduce the ultrasonic calls of bats to a pitch audible to humans and assists in identifying some species and species groups. Bats of the myotis group (3 species in Maine that can't be separated from each other by their calls) were detected in most areas. The little brown myotis and northern long-eared myotis were captured in several areas, indicating that these two species are fairly abundant and widespread. Hoary bats were seen, and calls consistent with this species were recorded in several additional areas throughout central Maine. Calls, which were most likely from red and silver-haired bats, were also detected; however, we have not been able to verify their identification.

—Craig McLaughlin, Karen Morris, and Walter Jakubas





Mark McCollough '94

BIRDS

The 1992 reorganization of the Department's Wildlife Resource Assessment Section expanded the Bird Group's mission. Population assessment and management recommendations for all bird species is now administered by the Bird Group. In the past, the Bird Group devoted most of its time to management of game birds, and other birds were the responsibility of the Endangered and Nongame Wildlife Group. While upland game bird and waterfowl work continues, other birds, such as shore birds and neotropical migrants, are now receiving increasing attention.

UPLAND BIRDS

Wild turkeys

Historical records document the existence of wild turkeys in coastal areas of Maine as far east as the Penobscot Bay area. Unfortunately, the last of Maine's native wild turkeys disappeared in the early 1800s because of unrestricted shooting and extensive forest-clearing. The reversion of thousands of acres of farmland back to wooded habitat has greatly enhanced prospects for re-establishment of wild turkeys into former ranges.

As early as the 1960s, Maine sportsmen began "thinking turkey." Fish and game clubs in the Bangor and Windham areas made attempts to reestablish turkeys into their areas using birds raised from part wild and part game-farm stocks. The Bangor stocking was unsuccessful, and the Windham population persisted in low numbers into the 1980s.

In the 1960s and 1970s, considerable work was done in other states to establish wild turkeys into former and new ranges of suitable habitat. Researchers noted the key to each success was to remove a small number of wild birds from one site and release them into suitable, unoccupied habitat.

Maine too became involved in a similar program in 1977, when department biologists acquired 41 wild turkeys from Vermont and released them in York County. By the early 1980s, the York County population had become large enough to serve as a source of birds for new release sites. In the spring of 1982, 33 birds were captured in York County and released in Waldo County. In the winter of 1984, 19 additional birds were captured in York County and released in Hancock County.

The Waldo County release was successful and resulted in a population that still appears to be increasing. Unfortunately, the Hancock County wild turkeys failed to produce a self-sustaining population. Illegal shooting of these birds was believed to be the major cause for this failure. Today, reports of wild

turkeys in western Hancock County, particularly in towns adjoining the Penobscot River, are common as birds crossed the river on their own.

Hunting seasons

By 1986, the York County wild turkey population had increased to sufficient size to allow a spring (bearded turkeys only) hunting season. Wild turkeys, like white-tailed deer, are polygamous, meaning that only dominant males in the population mate with females. Courtship activities for wild turkeys in Maine begin in April and last into May. The spring hunting season is timed to begin after most breeding is over. Experience has shown that spring turkey hunting provides a quality big game hunting opportunity without jeopardizing restoration efforts.

This past spring, 1,750 hunters were able to hunt wild turkeys in Maine, beginning on May 1. During the first two weeks of the season, hunters could only hunt in the zone they were assigned (either north or south). During the remaining two weeks of the month-long season, turkey permit holders could hunt in either the south or the north zone.

Maine's 1997 wild turkey season ended with a record harvest of 417 birds (Table 11). In the north zone, 203 turkeys were tagged, and 214 were taken in the south zone. The total harvest represents a substantial increase over last year's total harvest of 288 male birds. Part of the increase is attributable to an increase in the number of hunters afield in 1997. But, more importantly, turkey populations have increased significantly over the last few years. Expanding turkey populations have occurred because of favorable weather (mild winters resulting in fewer winter losses and favorable nesting and brood-rearing conditions) and the Department's trap and transfer activities.

Table 11. Wild turkey hunting effort and harvests, 1986-1997.

Year	Number of applicants	Number of permits	Wild turkeys harvested
1986	536	500	9
1987	519	500	8
1988	355	355	16
1989	463	463	19
1990	499	499	15
1991	508	500	21
1992	886	500	53
1993	1,079	500	46
1994	1,185	500	62
1995	1,714	750	117
1996	3,952	1,250	288
1997	5,091	1,750	417

As interest and participation in turkey hunting increases, hunters must be especially sensitive to issues of safety and hunter interference. We receive input from turkey hunters through the department's annual Turkey Hunter Survey. Results tabulated from these surveys give us information on hunting effort, harvests, and trends in turkey populations (Table 12). We now have 12 years of wild turkey hunting behind us in Maine and the population continues to increase and expand its range. These facts, and the relatively low harvest rates, are testament to the adaptability and wariness of this magnificent game bird.

Table 12. Trends in turkey hunter questionnaire results, 1991-1996.

	YEAR					
	1991	1992	1993	1994	1995	1996
Questionnaires						
Received	385	411	417	424	628	1,075
# Hunted	251 (65%)	273 (66%)	303 (73%)	332 (78%)	452 (72%)	876 (82%)
Hours Hunted	4,665	5,205	7,031	7,690	9,743	18,116
Gobblers Seen	200	403	513	815	1,202	3,586
Hens Seen	223	371	923	960	1,624	5,174
Turkeys Seen	423	774	1,436	1,775	2,826	8,760
# Shot At	30	72	78	107	154	406
# Registered	21	53	46	62	117	288
Weapon used						
Shotgun	241	257	283	305	429	825
Bow	14	22	32	42	24	39

Management and Research

For the last 10 years, emphasis has been on introducing wild turkeys into all suitable habitat between York and Waldo Counties. A "leap frog" trap and transfer technique was utilized with a goal of eventually joining these two populations. This goal was attained recently, and future restoration will be directed to suitable habitat inland of existing populations.

During the winter of 1996-97, wildlife biologists in Regions A and B trapped and moved 26 wild turkeys and released them at 2 new locations. Department biologists, working with turkey enthusiasts from various Maine Chapters of the National Wild Turkey Federation, continue to monitor these birds and strive to improve habitat for all wild turkeys in Maine with dollars generated through fund-raising activities.

By the year 2000, management efforts will focus on programs to improve habitat conditions for wild turkeys throughout their reoccupied range in Maine. Initial efforts at habitat improvement in southern Maine has already been effective.

We remain optimistic that our goal-oriented reintroduction program will succeed in reestablishing wild turkeys into all suitable habitat in Maine. We are

indeed thankful for the cooperation, financial support, and hands-on participation we've received from the public, L.L. Bean Inc., and especially the State Chapters of the National Wild Turkey Federation.

Individuals interested in becoming involved in wild turkey management are encouraged to contact the Maine State Chapter of the National Wild Turkey Federation, South Windham, Maine 04082, or one of the local chapters.

IMPORTANT!! Raising and releasing "game-farm" strains of wild turkeys will negatively impact the future success of this program, and it is not allowed by the Department. Birds from these strains do not survive or reproduce well in the wild, and they introduce inferior breeding stock into natural populations.

—R. Bradford Allen

Ruffed Grouse

Hunting seasons

The ruffed grouse, or partridge, is considered by many, the number one game bird in Maine. Maine data from early 1980s showed an estimated 100,000 hunters harvest over 500,000 grouse annually. More recent hunter surveys reveal approximately half of all licensed hunters in Maine hunted grouse and/or woodcock in 1987. Although no data exist on recent harvests except by moose hunters (see below), successful bird hunters reported grouse in excellent (1995) and fair (1996) numbers in recent years.

Grouse reports from Maine Moose Hunter Survey

For the last four moose hunts, moose hunters were asked to report the number of grouse they and their party sighted and harvested during the moose season (Table 13). Beginning in 1994, the number of grouse seen per 100 hours of hunting effort was recorded. That year, moose hunters reported sighting 35 birds per 100 hours of effort. In 1995, a banner grouse year by all reports, the average number of grouse seen per 100 hours of hunting was nearly three times that of the previous year, at 107. Last year, 1996, data indicate that the population was at or below average and the number of grouse seen per 100 hours was 20.

Table 13. Grouse harvests by moose hunters and others in their hunting party, 1993-1996.

	1993	1994	1995	1996
Permit holders reporting	888	1,069	1,252	1,321
Number of grouse seen	4,624	5,804	18,069	4,880
Number seen/100 hours of hunting	-	35	107	20
Grouse taken by permit holders	1,039	1,432	4,160	871
Grouse taken by others in party	1,022	1,146	3,779	836
Total grouse taken	2,061	2,578	7,939	1,707

During each moose hunt, 45-50% of all moose permit holders reported they hunted grouse during their moose hunt. In addition, over 80% of all moose hunting parties include individuals other than the moose permittee and the subpermittee. Many of these individuals were reported to hunt grouse as well during the moose hunt. Results of the survey indicate that slightly more than half of all grouse taken during the moose season are shot by moose hunt permittees and sub-permittees, and the other half are taken by others in the moose hunting party.

The total reported grouse harvest by moose hunters, and individuals in their hunting parties, over the last four moose hunting seasons was 2,061, 2,578, 7,939, and 1,707 birds (Table 13). The average grouse harvest over the four year period was 3,571. The total grouse take during the banner grouse year of 1995 was over three times the average 1993-94 harvest. This corresponds with the average sighting index where three times as many grouse were seen per 100 hours of hunting in 1995 than was reported in 1994.

The last statewide grouse harvest estimate was reported for the 1988 hunting season. That year, an estimated 579,100 grouse were taken. If we assume that harvests are similar today as were estimated in the late 1980s, then the average total grouse harvest by moose hunting parties is less than 1% of this total.

Management and research

Ruffed grouse are a product of the forest. The amount and quality of Maine's forests are constantly changing, and the impact of these changes on grouse populations are difficult to predict. Fortunately, however, the future for ruffed grouse appears bright. Timber harvesting is revitalizing grouse habitat as more and more commercial timber companies, state and private foresters, and small woodlot owners are utilizing harvesting practices that improve or sustain habitat for this species.

In the recent past, the Ruffed Grouse Society and the Department cost-shared habitat improvement work in Waldo County. Through this cooperative project, more than 1,000 apple trees were "released" from competition with encroaching forest growth that reduced the amount of sunlight and nutrients available to apple trees. The improved conditions for the apple trees will likely benefit ruffed grouse, deer, and other wildlife that eat apples, for many years to come.

Other ongoing work in ruffed grouse habitat improvement in Maine involves the following organizations: MDIFW, Champion International Corporation, University of Maine Cooperative Extension, Ruffed Grouse Society, Maine Forest Service, Small Woodlot Owners of Maine, and Maine Tree Farm Program.

—R. Bradford Allen

IMPORTANT!! Hunters, make sure you can distinguish between the legally hunted Ruffed Grouse and the Spruce Grouse, for which there is no open season. These two species of grouse do occur in the same areas of Maine, but the Spruce Grouse is far less common. In certain light conditions, the two species may look similar. As in any hunting situation, it is imperative that hunters be certain of their target before discharging a firearm.

Woodcock

Hunting seasons

A rangewide decline in woodcock numbers since 1968 resulted in restrictive hunting regulations. In 1985-86, all eastern states were required to shorten their woodcock hunting seasons, select opening dates no earlier than 1 October, and reduce the daily bag limits from 5 birds to 3. Researchers with the U. S. Fish and Wildlife Service report that, despite these restrictions, the rangewide woodcock population is still decreasing, and further reductions in woodcock hunting opportunity will be in affect for the 1997 hunting season.

Management and Research

Woodcock researchers in the east report that conditions on the 1996-97 wintering grounds for this diminutive bird were more favorable this year than last. Following the mild winter, birds migrated to Maine this spring at the normal time. However, April conditions were no joy to woodcock, as many days were wet and cold. Early indications is that the number of male woodcock on the singing grounds in the East were slightly higher than the previous year, which had been an all-time low.

In Maine, two independent singing-ground surveys were conducted, one at Moosehorn National Wildlife Refuge in Calais and a separate, but similar, statewide survey. Greg Sepik, USFWS wildlife biologist and woodcock specialist, reports the number of singing male woodcock at Moosehorn was nearly identical to last year's number. When Maine's statewide singing-ground survey data were tallied, the overall male population index was up 12% (Figure 10).

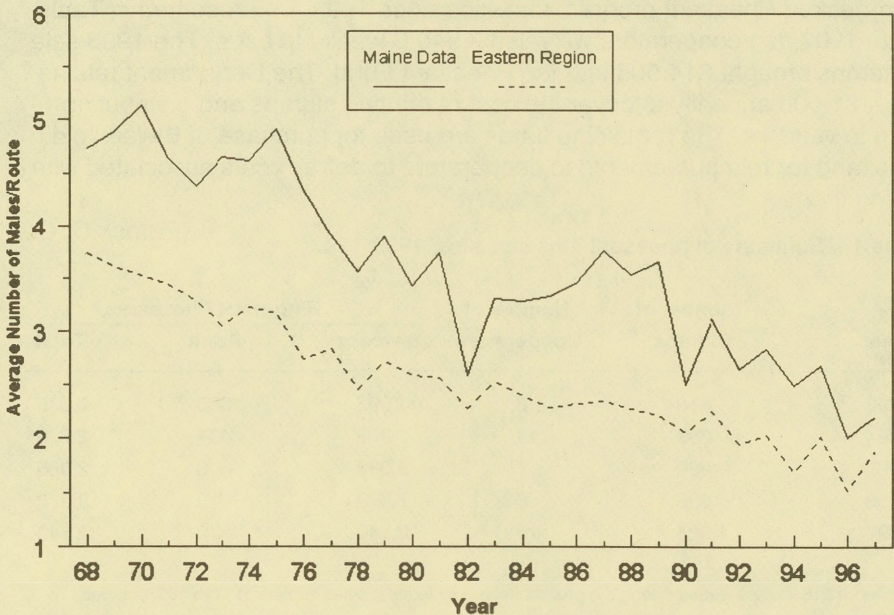
Maine's adult woodcock population remains below average. The reduced population can, to some extent, be replenished with a banner production year. This past May, we believed nesting conditions were not favorable for female and newly-hatched woodcock because of prolonged cold and wet weather. However, Dan McAuley, a wildlife biologist with the U.S. Geological Survey (USGS), and his English Setter Sadie, have been searching for and banding woodcock chicks this spring. Dan reports a good hatch this year, despite the bad weather. Further, Dan and colleagues from USGS, MDIFW, and USFWS, are beginning a study in Maine to investigate the effects of hunting on survival and habitat use of woodcock. Hunting is not believed to be the cause of the

woodcock population decline, nevertheless, hunting opportunity has been reduced. Although reasons for the population decline are complex, the USFWS believes a conservative harvest management strategy is necessary. In fact, additional changes in hunting season length will be in place for 1997. We believe there is an immediate need to determine the effects of harvest on this population, and, for that reason, we have designed a study to investigate this issue. We are pleased to have several partners on this project. In addition to the government agencies listed above, Champion International, Inc. and the Ruffed Grouse Society will be assisting us on this study.

The Department is very concerned about the status of woodcock and their habitat throughout its range. During the last 25 years, interest in woodcock hunting has grown, and rangewide harvests remain high. In the northeast, particularly, this increase in hunting pressure came at a time when woodcock habitat was being lost to urban and industrial development, and a large amount of forestland grew into stages not suitable for woodcock. Data from the recently instituted Harvest Information Program is vital for wise management of this species.

Suitable habitat is the key for healthy wildlife populations. Regarding woodcock habitat, biologists in Maine have turned their attention to the commercial timberlands as being a potential bright spot for improvements in woodcock habitat conditions. Although the soils may not be as productive as abandoned farmland, the vast acreage of young forests created by commercial clearcuts warrant attention. Preliminary research shows that commercial timberlands offer a great opportunity for large-scale woodcock

Figure 10. Breeding population index for woodcock, 1968-1997.



management in Maine. The next step is integration of cost-effective wildlife management into timber management plans, because, maintenance and creation of woodcock habitat is critical if woodcock populations are to be maintained at, or improved beyond, current levels.

—*R. Bradford Allen*

Pheasant

Pheasant populations currently exist at low levels where food and weather conditions permit winter survival. These limited wild populations are annually augmented by release of game-farm pheasants raised by fish and wildlife organizations and individuals with Maine Wildlife Propagators licenses.

The current pheasant stamp program was approved by the Maine Legislature in 1993 and was modeled after the experimental 1992 program. A Pheasant Fund was also established within the Department to manage moneys received from the sale of the pheasant stamps. These dollars may only be used for costs directly related to administration of the pheasant program, including grants to cooperators. These grants will help defray costs of purchasing and raising pheasants in accordance with an agreement between the cooperators and the Department.

The Commissioner may now enter into agreements with any qualified rod and gun club or hunting-oriented organization, which will allow for disbursement of money from the Pheasant Fund. Pheasants acquired and raised through this fund must be released under the direction of the Department, on lands in York and Cumberland Counties that are open for hunting to the general public.

Ring-necked Pheasant program statistics since 1993 are presented in Table 14. In 1997, ten cooperators will raise 2,540 6-week old birds. The 1996 sale of stamps brought \$14,505 into the Pheasant Fund. The Department retains about \$1,000 annually to cover the cost of printing stamps and distributing them to vendors. The remaining funds are used for purchase of 6-week old birds, and for reimbursements to cooperators to defray costs associated with raising them.

— *Patrick O. Corr*

Table 14. Summary of pheasant fund statistics, 1993-1997

Year	Number of Stamps ¹	Number of Cooperators	Ring-neck Pheasants		
			6-weeks	Adult	Total
1993	610	8	1,995	380	2,375
1994	699	11	1,905	434	2,339
1995	960	7	2,080	0	2,085
1996	895	8	2,370	0	2,370
1997	1,084	10	2,540	0	2,540

¹Number of \$16 stamps issued during the previous year - includes a small number (117 in 1996) issued complimentary to hunters over 70 years old.

WATERFOWL

Hunting Seasons and harvest

Waterfowl harvests in the United States have been declining since 1978 when 15.1 million ducks were recorded in the federal harvest surveys. This has been partly by design as regulations became more restrictive, but it also reflects declining hunter numbers and lower waterfowl populations. The estimate of Maine waterfowl hunters has also been declining since 1978, when the high of 18,650 Federal migratory bird hunting stamps were sold. The average number of stamps sold to Maine hunters has dropped from 14,545 (1981 to 1985) to 11,612 (1986-1990) to 9,908(1991-1995). Preliminary stamp sale estimates for Maine in 1996 was 9,258, up slightly from the lowest recorded sales of 8,704 in 1995 (Table 15).

Table 15. Maine and Atlantic Flyway waterfowl harvest and duck stamp sales, 1961-1996.

Year	Waterfowl Harvest		Duck Stamps Sold	
	Maine	Atlantic Flyway	Maine	Atlantic Flyway
1961-65 (mean)	46,000	879,900	9,656	265,023
1966-70 (mean)	78,400	1,577,100	15,136	403,386
1971-75 (mean)	92,400	1,700,500	17,512	453,018
1976-80 (mean)	83,400	1,941,500	17,444	429,533
1981-85 (mean)	73,200	1,675,900	14,545	399,429
1986-90 (mean)	54,200	1,202,400	11,612	354,730
Final Estimates				
1991	73,800	1,183,200	11,298	316,468
1992	54,900	1,010,600	10,128	300,332
1993	53,600	1,120,300	9,553	292,566
1994	57,700	1,147,400	9,855	296,842
1995	72,400	1,710,700	8,704	270,200
Latest Mean	62,480	1,234,440	9,908	295,282
1996 preliminary	72,180	1,604,000	9,258	298,120

Season lengths were shortened significantly between 1985-1993 (from 50 days to 30 in the Atlantic Flyway); this, in concert with declining numbers of hunters, led to a plunge in the estimated number of hunter days afield. In the Atlantic Flyway, the number of adult hunter days dropped from more than 2.9 million in 1978 to 1.5 million in 1992.

Restrictions in harvest regulations also resulted in reduced daily bag limits (5 birds to 3 per day); species restrictions in black ducks, pintails, wood ducks, and hen mallards; and curtailed framework opening and closing dates (from October 1 to October 5 and from January 15 to January 5). These flyway

restrictions between 1988 to 1993 essentially continued the harvest reduction plan for black ducks through 1993. Framework opening dates were moved back to October 1st, and season length in the Atlantic Flyway increased in 1994 to 40 days and again in 1995 to 50-days.

Black duck population declines, measured by the midwinter waterfowl survey since the mid-1950s, led to a harvest reduction plan in the United States and Canada. Between 1983 and 1987 (Period 1), black duck harvests were reduced in the U.S. by 42% (compared to the 1977-81 average) while the black duck kill in Maine for the same period was reduced by 61% (Table 16). Harvest reductions in other Atlantic Flyway states varied from 29% to 66% during this period. Reductions in Canada's black duck harvests have also been achieved since 1984. Our challenge will be to maintain a reduction in harvest rate for Maine black ducks while providing additional hunting opportunity for our hunters.

Although restrictive regulations continued in the Atlantic flyway between 1988-1993, Maine hunters have enjoyed expanded hunting opportunity for black ducks since 1988. In that year, the state imposed prohibition on black duck hunting in early October, was eliminated. From 1988 to 1993, Maine duck hunters had the same opportunity to kill black ducks as hunters in other states. The Maine harvest of black ducks was higher during the period of 30-day

Table 16. Maine and Atlantic Flyway black duck harvest data, 1977-1996.

State	Period 1			Period 2			Period 3	
	Base Yrs	Cut days	f/Blacks	30-Day Seasons			40 & 50-Day Seas.	
	77-81 Aver.	83-87 Aver.	% Ch. fr. Base	88-93 Aver.	% Ch. fr. Base	% Ch. fr. Per. 1	Aver. 94-96	% Ch. fr. Per. 1
ME	20,820	8,080	-61	10,250	-51	+27	10,130	-51
VT	6,420	4,120	-36	3,280	-49	-20	3,230	-50
NH	6,940	4,940	-29	2,900	-58	-41	2,870	-50
MA	24,540	16,260	-34	12,800	-36	-21	11,330	-54
CT	8,140	4,200	-48	3,920	-52	-07	3,530	-57
RI	5,680	2,620	-54	2,080	-63	-21	2,030	-64
NY	43,920	28,340	-35	25,450	-42	-10	21,800	-50
PA	11,040	5,640	-49	5,020	-55	-11	6,000	-46
WV	1,120	540	-52	280	-75	-48	330	-70
NJ	37,220	22,760	-39	15,400	-59	-32	10,070	-71
DE	9,760	5,720	-41	6,400	-34	+12	4,230	-57
MD	29,400	14,960	-49	12,820	-56	-14	11,270	-62
VA	19,040	12,760	-33	7,720	-59	-39	7,430	-61
NC	11,140	5,900	-47	6,350	-43	+08	6,030	-46
SC	7,240	3,500	-52	2,420	-67	-31	2,230	-69
GA	2,360	1,460	-38	770	-67	-47	300	-87
FL	860	290	-66	120	-86	-59	70	-81
F'way	245,640	142,090	-42	120,560	-51	-15	103,780	-58

seasons (Period 2—1988-1993) than levels attained between 1983 and 1987. The return to 40 and 50 day duck seasons (Period 3) since 1994 has challenged Atlantic Flyway waterfowl managers since the need to reduce black duck harvests is still required. However, seasons which maintain black duck harvest rate reductions while allowing additional hunting opportunity for hunters have successfully been established. Maine's estimated annual black duck harvest since 1988 has been maintained at -51% of those measured prior to black duck harvest restrictions. In fact, black duck kill estimates in the Atlantic Flyway during this latest period (1994-1996) were 16 percent lower than those measured during 30 day seasons (1983-87) and -58% of those measured prior to 1983.

The mid-winter waterfowl survey for black ducks has remained relatively stable since harvest reductions have been in place. Although no dramatic turnabout in the black duck's midwinter population index is obvious at this time, the long standing annual decline of 2.5 percent has been halted since 1983. While cause and effect is not proven, the cessation of the decline has coincided with U.S. and Canadian attempts to reduce the harvest rate on black ducks.

North American duck populations in 1997 are at high levels for most of the species annually estimated by Federal surveys. The population declines in prairie breeders was caused by years of drought during the 1980s. This adversely affected breeding habitat quantity and quality. A series of poor production years and poor recruitment reduced continental waterfowl populations to historical lows by the late 1980s. With the return of water to the U.S. and Canadian prairies, improved habitat conditions since 1994 have allowed most waterfowl populations to rebound. Only scaup and pintail numbers remain below goals established by the North American Waterfowl Management Plan.

Population surveys and habitat inventories completed during 1997 have shown marked improvements in both mid-continent duck breeding populations and habitat quantity and quality. These data support continued liberalization in harvest regulations during 1997. Maine hunters could have a 60 day season and a 6 bird daily bag limit this year for the most liberal hunting season ever allowed.

In addition to the extended season length, 1997 may mark the first time that states with Sunday hunting prohibitions mandated by state law will be allowed additional week days to compensate for lost opportunity. A recommendation to modify the federal frameworks to permit this change in established policy is being considered by the Service Regulations Committee.

A review of waterfowl hunter and harvest statistics provides an interesting comparison of Maine's waterfowlers and their success (Table 17). Study of these figures will reveal that the average Maine duck hunter today is doing quite well. This may surprise many of you who have listened to stories

Table 17. Maine waterfowl hunter and harvest statistics, 1961-1996.

Year	Number active hunters	Days afield by active hunters	Average days hunted	Average ducks per day	Average season bag/htr.	Total duck harvest	Canada goose harvest
1961-65 (mean)	7,580	45,580	6.24	1.01	6.56	45,980	550.00
1966-70 (mean)	12,519	73,020	5.85	1.13	6.96	78,360	980.00
1971-75 (mean)	14,410	101,140	6.98	0.91	6.10	92,360	2,260.00
1976-80 (mean)	13,654	105,200	7.36	0.78	5.31	83,360	1,840.00
1981-85 (mean)	9,949	86,640	7.37	0.88	5.95	73,180	1,560.00
1986-90 (mean)	8,607	61,840	6.71	0.89	5.50	54,160	2,300.00
Final Estimates							
1991	9,052	67,600	7.46	0.98	7.30	73,800	2,200.00
1992	7,946	48,700	6.13	1.05	6.42	54,900	2,800.00
1993	8,263	56,435	6.49	0.96	6.21	53,600	2,300.00
1994	8,680	60,247	6.94	0.93	6.44	57,700	2,400.00
1995	7,100	53,229	7.49	1.22	9.10	72,400	not open
Latest Mean	8,208	57,242	6.90	1.03	7.09	62,500	2,425.00
1996 preliminary	8,129	63,380	7.41	1.10	8.13	72,200	1,200.00

extolling the great old days of duck hunting. The number of hunters in the field today, as indicated by the 9,258 duck stamps sold in 1996, is close to the number commonly measured in the early 1960s. This is, however, much lower than the average number sold during the 1970s.

The average hunter in 1996 spent a little more time afield per season (7.41 days) as the hunters of the early 1960s (6.24 days), and was more successful than his 1960s counterpart (1.1 ducks per day compared to 1.01 in the 1960s). This daily duck bag is actually an improvement compared to the 1970s and 1980s, which were generally less than 1 duck per day.

A 30-year perspective of the waterfowl species composition in the Maine harvest shows that the relative importance of some ducks has dramatically changed over this period (Table 18, 19 and 20). Harvests of mallards have increased from less than 1,000 birds per year (1961-65 mean) to 10,000 in 1995. The common eider is another bird that has shown steady and dramatic increases in the annual Maine kill. Showing sizable declines in the Maine harvest are black duck, blue-winged teal, white-winged scoter, surf scoter, and black scoter.

Reasons for these changes in species composition are variable and in many cases different for each species. Some explanations for these changes include duck population increases and decreases, duck population center shifts, changes in the number of duck hunters, hunter effort shifts from one species group to another, and specific regulatory management designed to

Table 18. Maine dabbling duck harvest statistics, 1961-1996.

	Mallard	Black Duck	Green-winged Teal	Blue-winged Teal	Wood Duck
1961-65 (mean)	960	21,080	5,960	840	4,500
1966-70 (mean)	2,360	32,060	12,000	4,460	5,500
1971-75 (mean)	4,600	32,680	13,340	4,640	7,660
1976-80 (mean)	5,040	23,580	9,620	2,740	9,880
1981-85 (mean)	4,660	12,740	8,700	1,380	11,240
1986-90 (mean)	4,700	8,280	7,100	640	6,840
Final Estimates					
1991	8,800	13,700	5,000	0	7,600
1992	6,600	9,100	3,100	200	6,800
1993	7,400	9,900	4,800	100	8,200
1994	6,900	11,400	3,300	500	8,100
1995	10,100	11,100	9,000	1,200	9,300
Latest Mean	7,960	11,040	5,040	400	8,000
1996 preliminary	7,080	7,850	6,250	1,580	10,390

Table 19. Maine diving duck harvest statistics, 1961-1996.

	Greater Scaup	Lesser Scaup	Ring-necked Duck	Buffle-head	Common Goldeneye
1961-65 (mean)	125.00	50.00	950.00	1,780.00	2,240.00
1966-70 (mean)	220.00	100.00	1,100.00	1,980.00	2,380.00
1971-75 (mean)	200.00	160.00	1,550.00	3,340.00	2,040.00
1976-80 (mean)	260.00	360.00	2,620.00	6,240.00	3,040.00
1981-85 (mean)	220.00	300.00	2,620.00	4,340.00	4,040.00
1986-90 (mean)	100.00	180.00	2,750.00	2,240.00	2,940.00
Final Estimates					
1991	100.00	0.00	1,700.00	1,300.00	1,200.00
1992	0.00	100.00	800.00	2,700.00	700.00
1993	100.00	300.00	1,300.00	3,200.00	1,700.00
1994	0.00	100.00	2,800.00	4,400.00	2,700.00
1995	100.00	100.00	1,800.00	3,900.00	2,300.00
Latest Mean	60.00	120.00	1,680.00	3,100.00	1,720.00
1996 preliminary	0.00	100.00	2,130.00	3,480.00	2,029.00

Table 20. Maine sea duck harvest statistics, 1961-1996.

	Common Eider	Old Squaw	White-winged Scoter	Surf Scoter	Black Scoter
1961-65 (mean)	1,360	280	1,660	1,060	560
1966-70 (mean)	2,800	1,520	3,120	4,000	1,580
1971-75 (mean)	8,820	1,080	4,160	4,440	1,460
1976-80 (mean)	7,580	1,300	2,020	2,980	1,680
1981-85 (mean)	11,980	1,520	2,340	1,880	740
1986-90 (mean)	13,680	2,360	1,500	1,980	400
Final Estimate					
1991	25,900	2,200	1,100	1,460	660
1992	15,300	5,400	900	1,000	0
1993	6,900	2,500	2,000	2,000	900
1994	10,800	1,000	1,300	1,300	100
1995	15,300	1,000	2,000	1,300	200
Latest Mean	14,840	2,420	1,460	1,412	372
1996 preliminary	21,100	820	1,080	3,820	280

restrict harvest opportunity on some species more than others. All of these causes, and others, in combination have resulted in the observed changes in the Maine duck kill.

Research and Management

Since the 1985 species assessment was completed, the switch from a harvest oriented goal to a breeding population oriented goal has resulted in a more responsive program for waterfowl management in Maine. Waterfowl are now being managed to increase certain breeding populations. Low populations of black ducks caused major changes in regulations (1982-1987) that altered traditional seasons enjoyed by Maine waterfowl hunters.

One method used to increase breeding populations in Maine has been to eliminate, where and when possible, significant forms of non-hunting mortality. Lead poisoning of waterfowl is an example of this type of mortality. This national problem affects many thousands of birds annually, and lead shot use for duck and goose hunting has been banned nationally since 1991. Maine hunters were required to use steel shot statewide in 1988, three years ahead of the deadline required by the U.S. Fish and Wildlife Service's National plan. Maine hunters have accepted the facts and shouldered the responsibility for using the latest in shot-shell technology. Many have been pleasantly surprised with their results.

Habitat protection and enhancement efforts are another form of management that the Department is using to increase waterfowl breeding populations. Revenues generated from the sales of state waterfowl hunting stamps and art prints have been dedicated to acquisition and development of wetland habitat.

Current waterfowl research efforts are aimed at measuring and tracking trends in breeding populations and the harvests they support. A statewide survey of waterfowl pairs was initiated in 1990 as part of a larger study designed and funded by the North American Waterfowl Management Plan's Black Duck Joint Venture. Twenty-five randomly located plots have been surveyed since 1990 by Maine biologists using a U.S. Fish and Wildlife Service (USFWS) helicopter flown slowly at 100 to 150 feet above ground level. All open waters found within the plots were surveyed, and locations of waterfowl were recorded. Preliminary analyses of these data have provided trend estimates for common inland breeding waterfowl during the five year experimental stage. A slight decline in breeding pairs of black ducks in Mainewas demonstrated.

Evaluation of the 5-year experimental helicopter plot surveys proved them to be too expensive for continued annual surveys. Fortunately for eastern waterfowl hunters, population trends measured by more economical fixed-wing aircraft were shown to be similar to trends measured by helicopter surveys. In 1995, a fixed-wing transect survey was initiated in Maine. The USFWS plans to continue and expand these surveys in eastern North America during 1996. Maine and the eastern Canadian provinces have been surveyed by biologist using fixed wing transect methodology since 1996. As data from these additional areas and years are evaluated, the results will be used to establish harvest regulations for the Atlantic Flyway when fully implemented, eastern frameworks will be more independent of the mid-continent surveys.

Statewide surveys of waterfowl production are also continuing to provide an index to the status of our populations. These long-term brood count surveys have provided a means of following trends in waterfowl breeding populations since the mid-1950s. The proportion of broods observed during brood counts in Maine has changed over time (Table 21). One goal of the state waterfowl management plan is to restore the relative proportions of species found breeding in Maine to historical levels.

North American Waterfowl Management Plan

Coordination of Maine habitat protection efforts among several state and federal agencies, and private organizations, has resulted in some key land purchases that will benefit Maine waterfowl now and in the future. The stimulus for this coordinated effort has been implementation of the North American Waterfowl Management Plan and its various Joint Ventures.

The Atlantic Coast Joint Venture area includes all of Maine's inland and coastal wetlands. The emphasis for habitat protection in this Joint Venture is on significant waterfowl migration, wintering, and production areas. Efforts to

Table 21. Species frequency found in brood counts for Maine, 1956-1965, 1966-1976, 1980-1984 and 1986-1990¹.

	Period 1 1956-65 ²		Period 2 1966-76 ²		Period 3 1980-84 ³		Period 4 1986-90	
	Mean	Percent	Mean	Percent	Mean	Percent	Mean	Percent
Black Duck	74	44	37	29	34	19	56	24
Ring-necked Duck	28	17	31	24	44	25	49	21
Wood Duck	33	20	15	12	24	13	38	17
Goldeneye	13	8	23	18	36	20	39	17
Hooded Merganser	13	8	10	8	19	11	26	11
Green-winged Teal*	1	<1	1	1	2	1	1	1
Blue-winged Teal	5	3	5	4	4	2	1	1
Common Merganser	1	<1	4	3	11	6	12	5
Mallard	1	<1	1	1	5	3	7	3
Total Observed	169	100	127	100	179	100	229	100

*Known breeder: assigned 1 brood during 1956-65 and 1966-76 even though not observed in brood counts.

¹Mallard x black duck hybrids and Canada geese were excluded from analysis.

²Spencer, H. E., Jr. 1979. Table 5D.

³Allen, R. B. 1984 Annual Performance Report W-62-R-15-131.

secure protection will initially be directed toward the most significant and vulnerable areas.

The Cobscook Bay focus area, and the Merrymeeting Bay (lower Kennebec River focus area) are the two priority regions selected for projects in Maine. Efforts in these areas have resulted in a coordinated plan to secure protection for these important ecosystems. To date, our Department has received more than \$1.9 million from grants through the North American Wetlands Conservation Act. These funds have allowed coordinated habitat conservation projects through purchase of title or conservation easements in Cobscook Bay and the lower Kennebec River region. More than 20 organizations, working through the Maine Wetlands Protection Coalition, have identified priorities and worked to conserve the most significant properties in these focus areas.

A coordinated approach to habitat conservation in remaining focus areas, the east coast region (Penobscot Bay east), west coast region (west of Penobscot Bay), and inland wetlands focus areas, is planned as implementation of the North American Waterfowl Management Plan proceeds. Personnel and funding limitations have, to date, slowed progress on habitat initiatives in these focus areas. Money from two new programs, the Loon License Plate and The Maine Outdoor Heritage Lottery, are now available and will be used to continue and expand these efforts.

Harvest Information Program

Maine entered the Harvest Information Program during the 1996 hunting season. Hunters were required to have their license with them and checked as a migratory bird hunter to legally possess ducks, geese, woodcock, snipe, rails, gallinules, and moorhens during 1996 and subsequent seasons.

This initiative will, for the first time, provide migratory bird managers and wildlife administrators with statistically valid estimates of migratory bird harvests in the United States. Under this program, states must certify migratory bird hunters and provide their names and addresses to the USFWS. This list of hunters will be used to select a representative sample of hunters for their harvest surveys. All states are required to participate in this program by 1998.

Our Department has used this as an opportunity to improve our licensing program, and has started to develop data bases which will support conversion to point-of-sale licensing. The 1995 Maine hunting licenses were redesigned to be machine readable and for one year were produced in a larger format than previously. Future licenses will be much different from those of the past, but their format and method for distribution are still being developed.

OTHER BIRD GROUP ACTIVITIES

In the late 1980s, the Legislature passed the Natural Resources Protection Act (NRPA). The act consolidated several state laws pertaining to protected natural resources as being of state significance.

In an effort to protect significant wildlife habitat, and the birds that use these habitats, the Bird Group is developing species assessments for many coastal birds. The major groups of species that we are concentrating on are island-nesting seabirds, wading birds, and migratory shorebirds that depend on Maine's coast during spring and fall migrations. Island-nesting seabirds, wading birds, and shorebirds represent a large and diverse group of species, some occur in Maine in small numbers and others number in the thousands.

—Patrick O. Corr

Maine colonial waterbird inventory

Twenty-one species of island nesting seabirds and wading birds nest on approximately 10% of Maine's islands. These birds are extremely vulnerable to predation, but perhaps more importantly, to human disturbance during the nesting season (spring and early summer). For these reasons, close monitoring of nesting colonies is warranted. Beginning in 1994 and continuing through the 1996 nesting season, the Department monitored these populations in close cooperation with the United States Fish and Wildlife Service (USFWS), the principle funding source for inventory funds. This project was referred to as the Maine Colonial Waterbird Inventory. Bird Project personnel coordinated the collection of nesting data for numerous bird species

nesting on Maine's coastal islands. The Department relied heavily on the assistance of individuals representing the USFWS, National Park Service, National Audubon Society, The Nature Conservancy, College of the Atlantic, Damariscotta River Association and several private individuals, to complete this comprehensive inventory. Final counts remain to be conducted for a few of the nesting seabirds on the remotest islands, but preliminary results of surveys and inventories for many of the nesting birds are complete (Table 22).

—R. Bradford Allen

Table 22. Nesting colonial waterbirds and (number) of colonies used, 1976-1977 and 1994-1996.

	1976-77		1994-96	
Arctic Tern (ARTE)	1,640	(9)	2,695	(7)
Atlantic Puffin (ATPU)	125	(1)	195	(4)
Black-crowned Night Heron (BCNH)	117	(8)	109	(7)
Black Guillemot (BLGU)	2,668	(115)	12,341*	(167)
Cattle Egret (CAEG)	0	(-)	1	(1)
Common Eider (COEI)	22,390	241)	28,384*	(322)
Common Tern (COTE)	2,095	(24)	5,308	(22)
Double-crested Cormorant (DCCO)	15,333	(103)	19,538	(127)
Glossy Ibis (GLIB)	75	(3)	141	(3)
Great Black-backed Gull (GBBG)	9,847	(220)	15,799*	(247)
Great Blue Heron (GTBH)	903	(18)	644	(15)
Great Cormorant (GRCO)	0	(-)	206	(10)
Great Egret (GREG)	0	(-)	2	(1)
Herring Gull (HEGU)	26,037	(223)	27,624*	(189)
Laughing Gull (LAGU)	231	(6)	1,120	(3)
Leach's Storm-petrel (LHSP)	19,131	(17)	10,304	(34)
Little Blue Heron (LBHE)	4	(2)	9	(2)
Razorbill (RAZO)	25	(2)	250*	(3)
Roseate Tern (ROST)	80	(3)	161	(4)
Snowy Egret (SNEG)	90	(4)	182	(5)
Tricolored Heron (TRHE)	1	(1)	4	(1)

* Black Guillemot and Razorbill numbers are total counts of adult birds around nesting islands.

Common Eider nesting data are an amalgamation of nesting records collected over several years.

Herring and Great Black-backed Gull and Double-crested Cormorant numbers were derived from aerial counts, nest counts on selected islands, and by photo interpretation.

Migratory shorebird surveys

Shorebirds are represented in Maine by sandpipers, plovers, turnstones, godwits, curlews, dowitchers and phalaropes. Thirty-six species of shorebirds have been reported along the coast of Maine. Along with the Bay of Fundy, the Maine coast is recognized as a critical staging area for migratory shorebirds. Many of these migrants depend on such staging areas to accumulate the fat necessary to fly a non-stop transoceanic flight to their South American wintering areas.

Coastal staging areas are often discrete feeding and roosting habitats that are highly susceptible to disturbance and environmental contaminants. Bird project personnel have compiled a computer database of shorebird feeding and roosting areas, and mapped them for entry into a Geographic Information System (GIS). Field surveys for 1997 will target shorebird areas located in Washington county. Information collected will be used to further identify and assess these habitats. Analyses of coastwide data to identify areas critical to migratory shorebirds are under way.

We now have the tools to conserve many significant bird habitats. Species assessments for island-nesting seabirds and migratory shorebirds have been completed; goals and objectives and management systems are being developed; and criteria are established for identifying and mapping significant habitat for both species groups for NRPA protection. We are also developing standardized population surveys and inventories to track the status of other bird species and the habitats on which they rely.

—Lindsay Tudor

Songbird assessment

Maine is home to approximately 200 breeding birds and numerous other passage migrants and winter residents. The majority of these species are not hunted, and, as a consequence, have received little management attention. With 30 years of information from roadside bird surveys, populations of some of these nongame species appear to be in decline, whereas others appear stable or increasing (Table 23). In general, many of the species which use

Table 23. Estimated trends for selected songbird populations (% change per year) observed in Maine according to the North American Breeding Bird Survey.

Species	Habitat	1966-1996	1966-1979	1980-1996
Red-winged Blackbird	Marshes and Wetlands	-4.0*	-2.5	-2.1*
Tree Swallow	Fields and Marshes	+0.4	+3.8	-0.8
Savannah Sparrow	Fields and Pastures	+1.2	+3.4	+1.5
Bobolink	Fields and Pastures	-1.0	+3.1	-6.4*
Eastern Meadowlark	Fields and Pastures	-8.0*	-10.0*	-7.1*
Eastern Bluebird	Fields and Orchards	+12.2*	-8.8	+17.0*
Chestnut-sided Warbler	Brushy/Shrubby Areas	-1.6*	+2.5	-1.5
Gray Catbird	Brushy/Shrubby Areas	-2.4*	-0.1	-4.0*
American Robin	Yards and Forest Edge	-0.7*	-2.2	-0.4
Baltimore Oriole	Forest and Edges	+2.5*	+7.0	-0.2
Wood Thrush	Forest	-1.0	+13.2*	-3.9*
Blue-headed Vireo	Forest	+9.4*	+17.4*	+2.7
Ovenbird	Forest	+1.6*	+4.9*	+0.8
Scarlet Tanager	Forest	+3.4*	+15.6*	+2.1
Black-capped Chickadee	Forest	+3.1*	-4.7*	+3.4*

* Denotes statistically significant trend (Sauer et al. 1997. The North American Breeding Bird Survey Results and Analysis. Version 96.2).

early successional habitats, like old fields, appear to be in decline, but many of the forest bird populations appear to be stable or increasing.

With apparent declines in populations of some songbirds, and with regional and national coalitions taking shape to approach these complex issues, we've used revenues generated by the sale of Loon License Plates to address songbird conservation in Maine. Working in conjunction with Partners in Flight, a biologist within the bird group has begun developing a set of conservation plans for Maine's songbirds. These plans will serve as an assessment of the research and management needs for this group of birds for years to come. Integrating the Partners in Flight list of priority species, MDIFW's list of Special Concern species, and results of the songbird assessment, will greatly advance songbird conservation in Maine. Furthermore, this work will likely contribute important information for regional songbird conservation strategies as well.

Partners In Flight

In the early 1990s, a coalition, known as Partners in Flight, was formed between federal and state natural resource agencies, educational institutions, and private conservation groups to focus their collective efforts on the most important issues facing landbird conservation in the western hemisphere. Those species that winter in Central and South America, and breed in North America, were of primary concern because of population declines in parts of their range. Partners in Flight has worked to prioritize species of conservation concern for each state and region in the U.S. Also, through Partners in Flight's "Flight Plan", several physiographic areas have been identified in each region as units for a planning process that will identify research, management, monitoring, and outreach needs necessary to implement effective bird conservation strategies from coast to coast. Each state, or group of states, has a working group comprised of individuals dedicated to conserving bird populations.

Maine Partners in Flight is a working group assembled to address issues within the state of Maine. Nearly 70 individuals representing over 40 agencies, institutions, and organizations have participated in Maine Partners in Flight meetings and activities. Coordination of the Maine Partners in Flight working group resides within the Bird Group at MDIFW's Resource Assessment Section. Bird Group personnel serve as Maine's representative to the regional Partners in Flight working group. Partners in Flight has encouraged state working groups to take responsibility for priority species within their borders before they become rare by using cooperative management approaches based on the best scientific data.

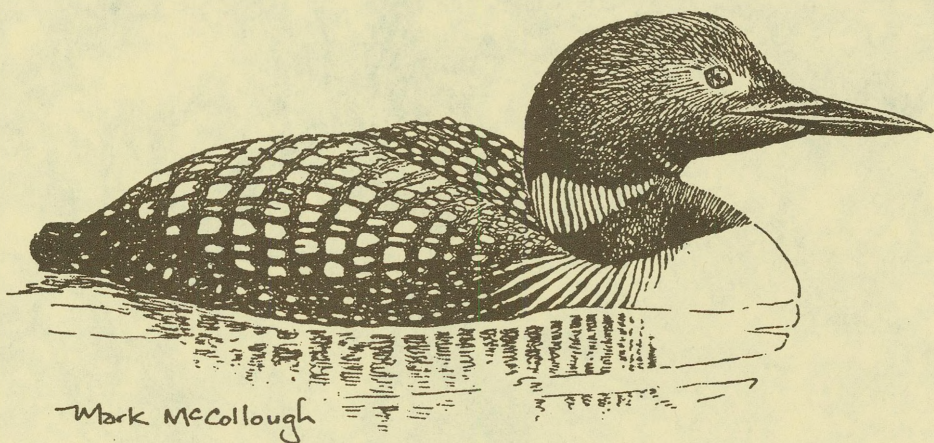
Within the Maine working group, small focus groups have emerged to address specific issues of landbird conservation in Maine. Current focus groups include atlasing and monitoring; information and education; and a group working to conserve habitat for grassland birds. More information about

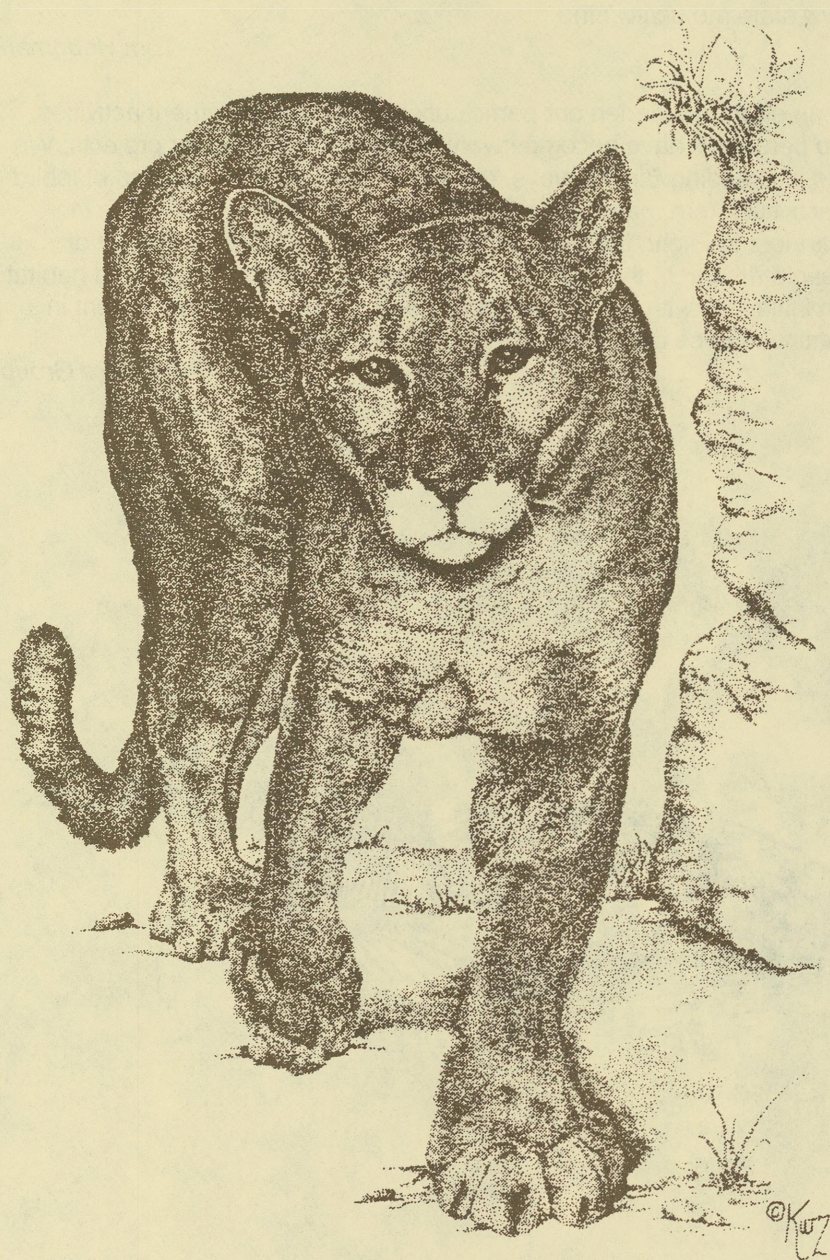
Partners in Flight activities in Maine, is available on our department's website (<http://www.state.me.us/ifw/pif>).

—Tom Hodgman

Lastly, in an effort to broaden our participation in bird management activities, bird group personnel have become involved in a number of other projects. We participate in Breeding Bird Surveys, mourning dove surveys, eastern bluebird banding activities, tern management activities, Partnerships for Wildlife in Maine, Partners in Flight, the Fish and Wildlife Service's and University of Maine's eagle research, the Maine Coastal Nesting Islands Forum, and habitat protection initiatives with numerous private land trusts. Bird management in Maine continues to be both challenging and rewarding.

—The Bird Group





ENDANGERED AND THREATENED WILDLIFE

In 1976, the Maine Endangered Species Act was passed to conserve all species of fish and wildlife found in the state, as well as the ecosystems upon which they depend. The Act authorized the Commissioner of Inland Fisheries and Wildlife to gather information about the distribution, abundance, habitat needs, limiting factors, and other biological and ecological requirements of Maine's fish and wildlife species, and to develop programs to enhance or maintain their populations. The Act also directed the commissioner to designate selected species as Endangered or Threatened and to establish programs to conserve those species. No funds were provided to carry out this mandate, and for several years little could be done.

In 1983, the state legislature created The Maine Endangered and Nongame Wildlife Fund by adding a checkoff option to the Maine income tax form, and, in 1994, initiated the "Loon License Plate." Fifteen percent of lottery ticket revenues from Maine's new Outdoor Heritage Fund are earmarked for Endangered and Threatened species projects. These programs allow people to donate to Endangered Species and other nongame wildlife management programs. The people of Maine contribute about \$100,000 a year through the tax form option, nicknamed the "Chickadee Checkoff" (Table 24), and, in its first three years, more than 90,000 loon license plates have been sold. These voluntary means of contributing provide the core funding for Maine's rare and Endangered Species programs. Grants from the U.S. Fish and Wildlife Service for Federal Endangered and Threatened Species provide another essential source of funding.

Table 24. A history of contributions from the "Chickadee Checkoff" to the Maine Endangered and Nongame Wildlife Fund.

Year	Total Given	Number of Givers	Average Donation	Percent of Taxpayers Giving
1984	\$115,794	25,322	\$4.57	5.34%
1985	\$129,122	29,200	\$4.42	5.96%
1986	\$112,319	26,904	\$4.17	5.41%
1987	\$114,353	26,554	\$4.31	5.19%
1988	\$103,682	24,972	\$4.15	4.75%
1989	\$93,803	20,322	\$4.62	3.65%
1990	\$88,078	18,332	\$4.80	3.23%
1991	\$92,632	19,247	\$4.81	3.42%
1992	\$95,533	18,423	\$5.18	3.19%
1993	\$82,842	15,943	\$5.20	2.80%
1994	\$84,676	10,863	\$7.79	1.99%
1995	\$81,775	10,014	\$8.17	1.79%
1996	\$90,939	11,024	\$8.25	1.95%

All money donated, whether through the tax checkoff, car registrations, grants, or direct gifts, are deposited into the Maine Endangered and Nongame Wildlife Fund, a special, interest-bearing account from which money can only be spent for the conservation of Maine's Endangered and nongame species. A nine-member citizens advisory council monitors the fund and the programs it supports. This section summarizes the work supported by The Maine Endangered and Nongame Wildlife Fund in 1996. Other related accomplishments are found in the Mammal, Bird, and Habitat sections of this publication.

Private organizations, individual volunteers, and every bureau of the Maine Department of Inland Fisheries and Wildlife are part of these successes. The U.S. Fish and Wildlife Service (USFWS) is a major partner. However, special thanks are due the thousands of Maine people who generously contribute to The Maine Endangered and Nongame Wildlife Fund. As you read this, take pride in your accomplishments - and please, as you fill out your tax return next year, and register your car, join with us again in conserving Maine's Endangered and Nongame species.

ENDANGERED SPECIES LISTING

The first comprehensive review of the status of species in Maine was initiated in 1984. Four Scientific Review Committees (one each for birds, mammals, fish, and amphibians-reptiles) were established to evaluate all vertebrate species occurring in Maine, to determine their risk of extinction from within the State of Maine, and to recommend species warranting listing as Endangered or Threatened. Their recommendations were reviewed by MDIFW biologists and scientists. Public workshops and meetings were held to discuss the listing recommendations, and a final list was submitted to the rulemaking process.

As a result of this process, six species were added as Endangered and four as Threatened in December, 1986, bringing the total number of Endangered and Threatened Species listed under Maine's Act (via state and federal avenues) to 27. The committees also identified about 80 other species they concluded either 1) could warrant listing but for which insufficient data were available to make that determination, or 2) did not currently warrant listing but were particularly vulnerable and could easily become Endangered or Threatened without proper conservation attention.

Maine's choice of the comprehensive, proactive approach to listing Endangered Species has resulted in a stable and predictable environment for decision-making in both the public and private sectors regarding Endangered Species issues. It has provided the foundation for an orderly development of public policy, and is primarily responsible for Maine being largely free of the costly and confusing conflicts from Endangered Species. It has eliminated the necessity for the State to be in a position of reacting to unexpected and perhaps unwarranted petitions for listing.

Determination of a species' status as Endangered or Threatened is based on the species' probability of extinction from Maine as determined from an assessment of each species' population, life history, and biology. It is essential that this step be objective and biologically-based, focusing on a species' risk of extinction from Maine. To ensure this objectivity, regulations were adopted in 1994, after public hearings and discussions, which specify six biological parameters to be used in evaluating a species' risk of extinction from Maine, they are

1. population viability;
2. population size;
3. population trend;
4. population distribution;
5. population fragmentation; and
6. endemism, meaning the species only occurs in Maine.

A species' status as Endangered or Threatened is a technical question analogous to determinations the Department of Transportation makes regarding bridge and highway integrity, or that doctors make in diagnosing diseases. After those determinations, there is a second step to determine what management actions, if any, are appropriate.

The biological status of species is dynamic; information about many species has improved, and public policy issues confronting the State have expanded. For these reasons, the 1986 list, as expected, was in need of revision if it was to continue to serve as it had for the past ten years.

The Department initiated the second comprehensive review of the status of species in Maine in 1994. Scientific Review Committees were again created. In addition to committees for birds, mammals, fish, and amphibians-reptiles, a committee addressing invertebrates was added for this review. This was done after consulting with the Legislature to clarify the intent of the Endangered Species Act, and to address the need for a clear and predictable public policy on invertebrates.

The committees undertook a comprehensive review of all species occurring in Maine, screened them against established guidelines and criteria, reviewed technical reports, and consulted with experts throughout the U.S. and Canada. Recommendations were reviewed and discussed at public meetings and with a wide range of interested parties. As a result, 20 species were proposed to be listed as Endangered or Threatened, which is less than 1% of all species considered, and included 7 species of birds, one fish, and 12 invertebrates.

In May 1997, the legislature approved and the Governor signed legislation adding these new Endangered or Threatened Species to Maine's list. In addition to these Maine listed species, there are a number of federally listed

species whose occurrence in Maine is known or suspected. A complete listing of both Maine and federally listed species is given in Table 25.

Table 25. Maine and Federally Endangered and Threatened fish and wildlife species (as of June 10, 1997)

Maine Endangered Species

Birds

- | | |
|---|--|
| Golden Eagle - <i>Aquila chrysaetos</i> | Least Tern - <i>Sterna antillarum</i> |
| Peregrine Falcon - <i>Falco peregrinus*</i> | Black Tern - <i>Chlidonias niger</i> |
| Piping Plover - <i>Charadrius melodus**</i> | Sedge Wren - <i>Cistothorus platensis</i> |
| Roseate Tern - <i>Sterna dougallii*</i> | Grasshopper Sparrow - <i>Ammodramus savannarum</i> |
| American Pipit - <i>Anthus rubescens</i> (breeding pop. only) | |

Reptiles and Amphibians

- | | |
|---|--|
| Blanding's Turtle - <i>Emydoidea blandingii</i> | Box Turtle - <i>Terrapene carolina</i> |
| Black Racer - <i>Coluber constrictor</i> | |

Mayflies

- A Flat-headed Mayfly - *Epeorus frisoni*

Damselflies and Dragonflies

- Ringed Boghaunter - *Williamsonia lintneri*

Butterflies and Moths

- | | |
|---|--|
| Clayton's Copper - <i>Lycaena dorcas claytoni</i> | Hessel's Hairstreak - <i>Mitoura hesseli</i> |
| Edwards' Hairstreak - <i>Satyrrium edwardsii</i> | Katahdin Arctic - <i>Oeneis polixenes katahdin</i> |

Maine Threatened Species

Birds

- | | |
|--|---|
| Bald Eagle - <i>Haliaeetus leucocephalus**</i> | Harlequin Duck - <i>Histrionicus histrionicus</i> |
| Razorbill - <i>Alca torda</i> | Arctic Tern - <i>Sterna paradisaea</i> |
| Atlantic Puffin - <i>Fratercula arctica</i> | Upland Sandpiper - <i>Bartramia longicauda</i> |

Mammals

- Northern Bog Lemming - *Synaptomys borealis*

Amphibians and Reptiles

- | | |
|---|--|
| Spotted Turtle - <i>Clemmys guttata</i> | Loggerhead Turtle - <i>Caretta caretta**</i> |
|---|--|

Table 25 (cont.)

Fish

Swamp Darter - *Etheostoma fusiforme*

Mollusks

Tidewater Mucket - *Leptodea ochracea*

Yellow Lampmussel - *Lampsilis cariosa*

Mayflies

Tomah Mayfly - *Siphonisca aerodromia*

Damselflies and Dragonflies

Pygmy Snaketail - *Ophiogomphus howei*

Butterflies and Moths

Twilight Moth - *Lycia rachelae*

Pine Barrens - *Zanclognatha zanclognatha martha*

Federally Listed Endangered or Threatened Species

(Currently or historically occurring in Maine but not listed under Maine's Endangered Species Act)

Birds

Eskimo Curlew - *Numenius borealis**/?

Mammals

Gray Wolf - *Canis lupus**/?

Humpback Whale - *Megaptera novaeangliae**

Eastern Cougar - *Felis concolor cougar**/?

Finback Whale - *Balaenoptera physalus**

Right Whale - *Eubalaena glacialis**

Sperm Whale - *Physeter catodon**

Sei Whale - *Balaenoptera borealis**

Amphibians and Reptiles

Leatherback Turtle - *Dermochelys coriacea**

Atlantic Ridley Turtle - *Lepidochelys kempi**

Fish

Shortnose Sturgeon - *Acipenser brevirostrum**

Beetles

American Burying Beetle - *Nicrophorus americanus**/?

Butterflies and Moths

Karner Blue - *Lycaeides melissa samuelis**/?

* = Federally listed Endangered Species ** = Federally listed Threatened Species
? = current presence uncertain in Maine.

(For the companion list of Endangered and Threatened Plants in Maine, contact the Maine Natural Areas Program, DOC, State House Station #93, Augusta, ME 04333)

HABITAT MANAGEMENT AND PROTECTION

Habitat protection is the most critical need of most Endangered and Threatened Species in Maine. MDIFW uses a variety of methods to protect critical habitat for them, including land acquisition, voluntary management agreements with landowners, conservation easements, environmental permit review, and designation as Essential Habitat under the Maine Endangered Species Act. Voluntary management with landowners, habitat acquisition, and conservation easements are the best tools for long-term protection of significant sites. Several important acquisitions were made by, or with the help of, the Department in 1996. Cooperative landowners, The Nature Conservancy, Maine Coast Heritage Trust, U.S. Fish and Wildlife Service, local land trusts, and others have worked together on these projects.

MDIFW reviewed hundreds of environmental permit applications in 1996, ranging from subdivision proposals to construction of wind power projects. All applications were screened to ensure protection of sensitive wildlife areas. About 25 sites important to Endangered or Threatened Species were identified and received attention through this process.

Another important habitat protection tool regularly used by the Department is voluntary, cooperative management of important sites for Endangered or Threatened wildlife. In 1996, cooperative management arrangements were in place on dozens of sites including lands under the jurisdiction of the state Bureaus of Public Lands and Parks and Recreation, Baxter State Park, Acadia National Park, U.S. Fish and Wildlife Service, most major timber industry landowners, and other private landowners.

Essential Habitat designation under the Maine Endangered Species Act also continues to be a valuable tool in protecting sites for Endangered and Threatened Species. Currently, 299 bald eagle nest sites, 9 piping plover and least tern nesting and feeding areas, and 21 roseate tern nesting areas have been identified as Essential Habitat. The success of this program continues to be demonstrated not only in the species' response to Essential Habitat protection, but also in the cooperative partnerships that have developed between state agencies, municipalities, and private landowners, thus avoiding land-use conflicts where Endangered Species are of concern.

—Alan E. Hutchinson

ENDANGERED AND THREATENED SPECIES STUDIES

Bald eagle

Bald eagles generally continued their recovery in Maine in 1996. The growth and range expansion of the breeding population (Table 26) are reflected by the record count of 203 nesting pairs last year. This figure eclipses one of the

Table 26. Bald eagle nesting and productivity in Maine, 1962-1970 and 1972-1996¹.

Year	Occupied Sites	Successful Sites		No. Young Fledged	Young Fledged/Nest		Occupied Nests Fledging # of Young			
		N	%		Occupied	Successful	0	1	2	3
1962	27	8	30	8	0.30	1.00	19	8	0	0
1963	32	9	28	12	0.38	1.33	23	6	3	0
1964	28	6	21	6	0.21	1.00	22	6	0	0
1965	33	4	12	4	0.12	1.00	29	4	0	0
1966	28	7	25	11	0.39	1.57	21	3	4	0
1967	21	4	19	6	0.29	1.50	17	2	2	0
1968	23	9	39	11	0.48	1.22	14	7	2	0
1969	29	11	31	15	0.52	1.36	18	7	4	0
1970	32	8	25	11	0.34	1.38	24	5	3	0
1972	29	8	28	8	0.28	1.00	21	8	0	0
1973	31	6	19	6	0.19	1.00	25	6	0	0
1974	36	12	33	12	0.33	1.00	24	12	0	0
1975	31	9	29	11	0.35	1.22	22	7	2	0
1976	41	12	29	19	0.46	1.58	29	6	5	1
1977	50	24	48	35	0.70	1.46	26	16	5	3
1978	62	20	32	32	0.52	1.60	42	9	10	1
1979	52	29	56	38	0.73	1.31	23	20	9	0
1980	56	29	52	40	0.71	1.38	27	19	9	1
1981	63	34	54	49	0.78	1.42	29	19	15	0
1982	72	36	50	56	0.78	1.56	36	17	18	1
1983	74	40	54	60	0.81	1.50	34	20	20	0
1984	66	35	54	46	0.70	1.31	31	24	11	0
1985	86	51	59	75	0.87	1.47	35	27	24	0
1986	89	50	56	76	0.85	1.52	39	25	24	1
1987	91	46	51	65	0.71	1.41	45	28	1	1
1989	109	45	41	70	0.64	1.56	64	20	25	0
1990	123	69	56	98	0.80	1.42	54	40	29	0
1991	127	79	61	117	0.92	1.48	48	44	32	3
1992	140	77	55	113	0.81	1.47	63	43	32	2
1993	150	84	56	115	0.77	1.37	66	53	31	0
1994	175	101	58	142	0.81	1.40	74	61	39	1
1995	192	118	62	176	0.92	1.47	74	63	52	3
1996	203	95	47	141	0.69	1.48	108	50	44	1

¹Data comparisons between the periods 1962-67 and 1968-96 are invalid due to variations in survey methodology, regional emphasis, and intensity. 1988 data were incomplete due to a lack of funds.

criteria for delisting bald eagles from their status as a threatened species, but several other shortcomings from this past season reflect why there is continuing concern for a lasting recovery by the species.

Production of young eaglets declined by 14% from the record set in 1995 and fell below the 1994 level. Poor nesting success has plagued Maine's eagles by slowing the rate of recovery. Environmental contaminants have influenced Maine's eagles for 50 years. Research continues cooperatively with the University of Maine and federal wildlife officials to examine these lingering impacts. Organochlorine contaminants (especially DDE, a by-product of the insecticide DDT, and industrial pollutants such as PCB's) and heavy metals (notably mercury) have impaired the rate of eagle recovery in Maine. These chemicals break down very slowly in the environment, and Maine eagles continue to accumulate them through dietary exposure.

Also, twenty-five adult eagles were found dead or seriously injured in Maine last year. If poor nesting success from past years is still hampering recruitment, the population growth could be set back in upcoming years. Many of the problems result from impact injuries and other human-related causes. Several injured birds were successfully rehabilitated thanks to the combined efforts of game wardens or concerned citizens who found them, cooperating veterinarians and Tufts University who provided diagnostics and clinical care, and a few special wildlife rehabilitators who aided their recovery.

Peregrine falcon

The peregrine is also on the way back in Maine and throughout the U.S., wherever reintroduction efforts have been undertaken. In fact, restoration programs for this species have been conducted in more than 35 countries following a worldwide decline of peregrines in the mid-twentieth century. Like bald eagles and many other birds of prey, they were victimized by the effects of DDE in the environment. A traditional resident of mountainous cliffs and coastal headlands in Maine, nesting peregrines were absent from the state for more than 25 years. The last residency of peregrines in the eastern U.S. prior to recent restoration programs, was documented in Acadia National Park during the early-1960s.

Peregrines for reintroduction are produced in special captive breeding projects. Young peregrines arrive at their planned release sites in Maine when they are 4-5 weeks of age. After acclimating to their new surroundings, they are released at 6 weeks of age, but field technicians stay on duty for another 5 to 6 weeks. Daily care, feeding, and monitoring promote normal development of young peregrines, enhancing their survival following late summer dispersal.

Many peregrines die of natural causes, just like other wild animals, so it is important to maintain the supply of reintroduced peregrines until a viable population is re-established. The needs and options for continuing these peregrine releases are reviewed annually to optimize their effectiveness. A

total of 131 young peregrines were successfully released at 7 different locations in Maine during 1984-95. More than 93% of young peregrines released in Maine have survived during reintroductions. With diminishing emphasis in the West, the Peregrine Fund offered to make additional birds available for Maine's successful restoration program.

In 1996, MDIFW conducted two reintroductions of captive-produced peregrines. All fourteen fledged successfully. Observations of peregrines at 10 different locations in 1996 provide some optimism for future population increases. Four eyries were successful, and a total of 9 young were naturally produced. A third pair of peregrines in Acadia National Park, and territorial behavior of peregrines at the Route 1 Waldo-Hancock bridge, were newly established in 1996.

The combined input of 23 young peregrines in Maine during 1996 should contribute to an increasing number of peregrines in upcoming years. If you witness the spectacular vertical dives of a peregrine, or otherwise suspect their presence, please contact the nearest MDIFW office. Watch and enjoy a rare and thrilling sight!

Golden eagle

The golden eagle continues to bear the unfortunate distinction as the rarest breeding bird in the eastern U.S. It once inhabited mountainous cliffs along the Appalachian Mountains from the mid-Atlantic states to Labrador. Only one nesting pair remains in Maine, and it is the only breeding record for the species currently documented in the northeastern U.S. Sightings are occasionally reported from Maine's western mountains or northern interior. These goldens may be migrants from Quebec, but they also offer hope that additional nests may be discovered.

Unfortunately, Maine's single breeding pair has failed to nest successfully for 14 consecutive years. Eleven golden eagle eyries are historically known in Maine, but only three have been inhabited by goldens during the last 25 years. Only 3 young golden eagles have been produced by resident pairs in Maine in the last 20 years.

Certainly, the outlook is grim for the golden eagle. There are natural habitat limitations on the species in the East, which have made them rare throughout recorded history. Golden eagles are relatively numerous in the West, where open terrestrial habitats favor their normal lifestyle of preying upon small mammals. The extensive forestlands in Maine cannot be used as hunting areas by golden eagles.

Goldens in Maine traditionally preyed on wading birds (such as herons and bitterns) in open wetlands. Such a diet would have made them particularly vulnerable to environmental contaminants, which took their toll on reproduction of bald eagles and peregrine falcons in Maine. Great blue herons, apparently

a mainstay food for golden eagles in Maine, contained some of the highest DDE residues ever found in wildlife. Apparently, contaminants have brought the few golden eagles of the northeastern U.S. to the threshold of extinction. Two unhatched eggs were recovered from Maine's failed golden eagle eyrie in 1996. This is a special opportunity to help understand the species' decline. Chemical analyses should reveal the degree of contaminant problems.

The immediate priority in Maine has been to manage the few suitable nesting habitats that once supported golden eagles. The last remaining pair is being carefully monitored to learn more of the species' needs in the East, and to identify factors limiting their existence. There is some evidence of increases in a small breeding population in eastern Canada, an area upon which the future of golden eagles in Maine is dependent.

Grasshopper sparrow

Grasshopper sparrows are listed as Endangered by MDIFW because of low numbers and declining nesting habitat. Maine is presently the northeastern edge of the range of the grasshopper sparrow. The species now nests at only four locations in the southern part of the state. Grasshopper sparrows inhabit large sandy grasslands and blueberry barrens that are vegetated with sparse bunch grasses. These grassland habitats are also rare in Maine, and each requires some form of vegetation management.

The largest nesting population of grasshopper sparrows in New England occurs on 600 acres of blueberry barrens and grasslands on the Kennebunk Plains in West Kennebunk. This site annually supports from 40 to 60 percent of the statewide breeding population. The 1996 census identified 16 singing males, the best indicator of territorial pairs. Twenty-five singing males were found at three other locations in 1996.

The Kennebunk Plains was purchased by the State of Maine and The Nature Conservancy and is now a Wildlife Management Area managed by MDIFW, in cooperation with The Nature Conservancy. Prescribed burns have been conducted to maintain suitable habitat for grasshopper sparrows and other grassland birds. MDIFW is also working with the U.S. Navy, the City of Sanford, and Maine Department of Transportation to maintain grasshopper sparrow habitat at the Brunswick Naval Air Station, Sanford Municipal Airport, and the Augusta Airport, respectively.

Regional declines are increasingly evident in a variety of grassland nesting birds. Grasshopper sparrows are joined by upland sandpipers (a state threatened species) and three special concern species: vesper sparrow, eastern meadowlark, and short-eared owl. MDIFW secured support from Maine's Outdoor Heritage Fund to conduct a two-year study of grassland nesting birds starting in 1997.

—Charles S. Todd

Piping Plover

Piping plovers are small, sand-colored shorebirds that nest on sandy beaches and dunes along the Atlantic Coast from South Carolina to Newfoundland. In Maine, the piping plover is listed as Endangered by MDIFW because of its extreme rarity in the state and because of threats it faces during the nesting season.

In 1990, a recovery plan was completed for the Piping Plover in Maine, establishing the Department's goals and objectives. The objectives were to increase the plover population to at least 20 nesting pairs at 7 sites and producing at least 2 chicks per pair.

Maine's population of piping plovers has been monitored annually since 1981. During this period, the number of pairs reported has fluctuated between a low of 7 pairs at 4 sites in 1983, to a high of 60 pairs at 18 sites in 1996 (Table 27). Nineteen different beaches have been used during the period. The overall population trend has been one of increase, due largely to intensive management at nesting sites and cooperation of private landowners and towns in southern Maine.

Table 27. Piping plover nesting and productivity, 1981-1996.

Year	Number of Pairs	Chicks fledged	Productivity
1981	10	9	0.90
1982	10	18	1.80
1983	6	7	1.17
1984	21	9	0.43
1985	15	28	1.87
1986	15	31	2.07
1987	12	21	1.75
1988	20	15	0.75
1989	16	38	2.38
1990	17	26	1.53
1991	18	45	2.50
1992	24	49	2.04
1993	32	76	2.38
1994	35	70	2.00
1995	40	95	2.38
1996	60	98	1.63

Productivity of piping plovers in Maine, measured as number of chicks fledged per nesting pair, has ranged from a low of 0.9 chicks per pair in 1981 to a high of 2.5 chicks per pair in 1991 (Table 27). Statewide productivity since 1984 has been among the highest documented in any Atlantic Coast state or province. Productivity in Maine has exceeded 1.7 chicks per pair in nine of the past eleven years. The trend in productivity has been generally one of increase since 1981. In 1996, a record 60 pairs of piping plovers nested at 18 sites and successfully fledged 98 chicks.

Monitoring and management of piping plovers in Maine has been carried out primarily by Maine Audubon Society, The Nature Conservancy, and U.S. Fish and Wildlife Service biologists, with partial funding from MDIFW. Biologists conduct annual surveys of abundance and reproductive success and determine factors limiting productivity. Nests are protected from human disturbance, pets, and natural predators such as foxes, skunks, and crows by wire enclosures. Nesting areas are fenced and signed to diminish human disturbance.

—Mark A. McCollough

Least tern

Least terns are the smallest of four species of terns that nest along the coast of Maine. Least terns nest on a few sandy beaches in southern Maine. They are listed as Endangered by MDIFW because of their rarity and because of threats to nesting colonies and habitat.

Nesting colonies of least terns in Maine are monitored and protected by Maine Audubon Society and The Nature Conservancy biologists, with partial funding provided by MDIFW. During the past 11 years, the statewide population has fluctuated from a low of 39 pairs at 3 sites in 1982, to a high of 125 pairs at 4 sites in 1993 (Table 28). Since 1979, total productivity in Maine has ranged from 12 to 123 young fledged annually. In 1996, 60 pairs nested at 5 sites and produced only 30 fledglings.

Table 28. Nesting and Productivity of Least Terns in Maine, 1977-1996.

Year	Number of Pairs	Chicks fledged	Productivity
1977	55	50	0.90
1978	93	66	0.70
1979	78	31	0.39
1980	62	34	0.54
1981	78	21	0.26
1982	39	26	0.66
1983	54	29	0.53
1984	88	82	0.93
1985	105	12	0.11
1986	124	30	0.24
1987	89	12	0.13
1988	98	40	0.40
1989	83	8	0.09
1990	65	44	0.69
1991	52	25	0.48
1992	94	123	1.47
1993	125	114	0.91
1994	89	79	0.89
1995	100	16	0.16
1996	60	30	0.50

The erratic productivity of these birds in Maine can be attributed to human disturbance; destruction of nests or young by humans, foxes, skunks, raccoons, crows, dogs, and cats; and habitat alteration from coastal development. Management of least terns in Maine includes protection of nesting colonies with symbolic fencing, snow fencing or chicken wire, and predator control. Symbolic fences are fences of stakes and twine with warning signs around the nesting colonies. Public education to inform recreational beach-goers and local residents about the conservation needs of least terns is another important management activity. MDIFW and Maine Audubon are developing management recommendations for each of the nesting beaches to aggressively confront predation and disturbance problems.

—Mark A. McCollough

Roseate tern

The roseate tern is listed as an Endangered Species by Maine and the Federal government. Roseate terns nest with common and arctic terns on coastal islands in Maine. The islands are critical to survival of the species, since they typically provide undisturbed, predator-free nest sites. With an increase of gulls on the coast (a predator and competitor of the terns), and an increase of human disturbance on the islands, tern numbers and reproductive success have declined to where the species is now listed as Endangered.

In the 1980s, 50-80 pairs of roseate terns nested in Maine. Their numbers have increased in response to management and 161 pairs nested in Maine in 1996 (Table 29). In the 1930s, 200-300 pairs nested in the state.

Recovery of this species is a cooperative venture among the U.S. Fish and Wildlife Service, National Audubon Society, Maine Audubon Society, College of the Atlantic, and MDIFW. In 1990, MDIFW developed a recovery plan for the roseate tern. The Department's goal is to increase the population of roseate terns to 200-300 pairs. In 1992, protection of 21 historic nesting islands was attained using Essential Habitat provisions of the Maine

Table 29. Number of nesting pairs of terns off coastal Maine, 1984-1996.

Year	Common Terns	Arctic Terns	Roseate Terns
1984	2,543	3,170	76
1987	2,173	3,170	52
1988	2,955	3,824	74
1989	2,741	4,151	81
1990	2,810	3,979	108
1991	4,032	3,898	128
1992	3,716	4,356	122
1993	4,313	4,478	142
1994	4,361	5,029	144
1995	5,011	5,138	153
1996	5,847	4,401	161

Endangered Species Act. In 1994 and 1995, new tern restoration projects were initiated to benefit roseate terns at the mouth of the Kennebec River and Blue Hill Bay. Populations of common terns and arctic terns are also benefiting from this effort.

—Mark A. McCollough

Blanding's and spotted turtles

Two of Maine's rarest reptiles, the spotted and Blanding's turtles, are semi-aquatic species preferring clean, shallow wetlands. Spotted turtles are small (5 to 6 inches long) and have yellow spots on the head, tail, and legs and a slightly flattened, black, upper shell. Blanding's turtles are medium-sized turtles (7 to 10 inches long) with a yellow throat and light-colored flecking on a domed, helmet-shaped shell.

Little was known about either of these species until the Maine Amphibian and Reptile Atlas Project (MARAP) was conducted in the 1980s. As a result of MARAP, spotted turtles were recorded at about 20 different sites from Kittery to Orrington. Blanding's turtles were known from only about 20 locations in Maine, all in York County. In 1990, MDIFW increased efforts to learn more about the distribution of these threatened turtles. Sufficient numbers were discovered in York County to warrant additional studies of their abundance, movements, habitat use, and ecology. In 1995, in collaboration with the University of Maine Wildlife Department and Maine Audubon, graduate student, Lisa Joyal completed a study of two populations of both species in the Mt. Agamenticus area. More than 80 turtles were marked or radio-tagged to gather information on nesting and hibernation sites, movements, and the types of wetlands being used. In 1994, the Environmental Protection Agency provided additional funding to MDIFW to continue systematic surveys of wetlands for Blanding's and spotted turtles in all of York and Cumberland Counties. Over 2,500 wetlands have been surveyed, and approximately 100 new sites have been discovered.

In 1996, MDIFW and the Maine Natural Areas Program began working with towns, land trusts, private landowners, and private conservation groups to initiate planning for conserving the habitat of these species

—Mark A. McCollough

OTHER STUDIES

A number of species of fish and wildlife are of concern to Maine and other State Fish and Wildlife Agencies in the Northeast, due to their possibly warranting Federal Endangered or Threatened Species listing. As part of MDIFW's Endangered Species Cooperative Agreement with the USFWS, and in cooperation with other states, MDIFW periodically conducts special investigations and management projects for those species. The purpose is to acquire information about the species and their conservation needs, or to manage the species, and, if successful, thereby possibly eliminate the need to

list the species as Endangered or Threatened. Actions this past year included the following:

Wood turtles

Although not Endangered or Threatened, wood turtles are a species of management concern in Maine. They are found throughout the state in streams and rivers. During summer months they inhabit adjacent riparian areas. Appropriate habitat occurs throughout the state. The greatest threat to Maine's wood turtles is illegal collection for the pet trade. Collectors can decimate local populations in a short period of time. Several instances of large collections of wood turtles have been investigated by the Warden Service in Maine in recent years.

In 1995, Central Maine Power initiated a study of wood turtles in western Maine. By following radio-tagged individuals, they were able to learn much about their movements and habitat use. In 1996, these studies were expanded by MDIFW and the University of Maine. Honors student, Micah Remley, was able to track about 35 radio-tagged turtles and locate 7 nests. His study was the first to document nesting ecology of the wood turtle in the state.

In 1996, MDIFW and the University of Maine received an Outdoor Heritage Fund grant to expand studies of wood turtles in Maine. Brad Compton will continue research on habitat use, movements, and nesting ecology. A second student will conduct a state-wide and range-wide genetics study.

—Mark A. McCollough

Tomah mayfly

The "Tomah" mayfly is a rare insect that is a candidate for Threatened or Endangered Species status by the U.S. Fish and Wildlife Service and the State of Maine. This large mayfly was first collected early in this century from a single location on the Sacandaga River in New York. Damming of the river, and associated construction, destroyed the sedge meadow habitat at this site in the 1930's. The species was assumed to be extinct for nearly 50 years until it was "rediscovered" in Tomah Stream, Washington County by University of Maine entomologist, Dr. Cassie Gibbs, in the 1970s. It has since been found at several other locations in Maine and in historic collections made in New York, Labrador, and Quebec.

This insect is unique in many ways. It is the only representative of the genus *Siphonisca*. Some have described it as a "living fossil" as it has large projections on the abdomen, characteristics of ancient Carboniferous insects. The nymphal stage is carnivorous and preys on other mayfly nymphs. This species depends on seasonally-flooded sedge meadows along large streams or rivers to complete its life cycle. This highly productive habitat supports abundant populations of mayfly nymphs that, in turn, serve as prey for *Siphonisca*. Finally, research suggests that a portion of the females may be able to successfully reproduce without males. Figure that one out!

MDIFW has been cooperating with the University of Maine and the USFWS to learn more about this intriguing insect and to insure its conservation. Studies have focused on its distribution, population size, and habitat needs. MDIFW is also concerned about threats (damming, pollution, wetland alteration) that may alter the sedge meadow, an increasingly rare natural community, where this rare creature still exists.

—Beth I. Swartz and Mark A. McCollough

Freshwater mussels

Freshwater mussels are relatively sedentary, bottom-dwelling invertebrates found in many of Maine's lakes, ponds, rivers, and streams. Often referred to as a "clam," the freshwater mussel's inconspicuous and seemingly drab lifestyle belies its importance. As filter feeders, mussels provide a valuable service to their aquatic environments by siphoning out impurities from the water as they feed. In turn, mussels provide food for a variety of larger predators.

The life histories of these animals are unique and interesting. All freshwater mussels start life as free-floating larvae, vastly different in appearance from the adults. The young of most species must then chance upon, and attach to, a very specific fish host in order to mature into the more familiar adult form. Once the tiny mussels have dropped off their mobile nurseries (they do no harm to the fish!) and burrowed into the substrate, they typically remain in the same spot for their entire lives. For some species, a lifetime can span 100 years or more!

Freshwater mussels are also one of the most diverse groups of species in North America. About one third of the world's mussel species are found in the United States, and nearly all of those occur east of the Mississippi River. Maine is relatively poor in mussel diversity, with only eleven species currently documented as living here (Table 30). Although most of our mussel species are widely distributed throughout the State, each one has a unique set of habitat requirements: some are found only in flowing water, and others occur in still water; some species prefer sand or mud substrates, and others succeed

Table 30. Freshwater mussels of Maine

Common Name	Scientific Name
EasternRiver Pearl	<i>Margaritifera</i>
Eastern Elliptio	<i>Elliptio complanata</i>
Triangle Floater	<i>Alasmidonta undulata</i>
Brook Floater	<i>Alasmidonta varicosa</i>
Eastern Floater	<i>Pyganodon cataracta</i>
Newfoundland Floater	<i>Pyganodon fragilis</i>
Alewife Floater	<i>Anodonta implicata</i>
SquawFoot	<i>Strophitis undulatus</i>
Yellow Lampmussel	<i>Lampsilis cariosa</i>
Eastern Lampmussel	<i>Lampsilis radiata radiata</i>
Tidewater Mucket	<i>Leptodea ochracea</i>

only on gravel or cobble bottoms. Flow rate, water depth, water chemistry and temperature, availability of fish hosts, and substrate type are some of the factors determining where each mussel species can survive.

Habitat integrity is an equally important component influencing mussel survival. Freshwater mussels are very sensitive to contaminants and changes in their environment - a vulnerability compounded by a filter feeding strategy, specific habitat and fish host requirements, and an inability to leave their surroundings. Consequently, freshwater mussels are one of our most valuable indicators of water quality and ecosystem health. They are also one of the most imperiled groups of animals in the country. Approximately half of the species representing our uniquely diverse mussel fauna have already vanished, or are in danger of extinction. Of the nearly 300 species of freshwater mussels found in the United States, at least 21 are thought to be extinct, 56 are currently on the federal Endangered Species List, and an additional 74 are candidates for listing.

Freshwater mussels are in trouble because pollution, dams and other water control structures, channelization, dredging, and sedimentation of our once clean, free-flowing rivers and streams have all contributed to the degradation and loss of mussel habitat. In addition, poaching of shells for trade to the Orient and the recent invasion of a prolific foreign competitor, the zebra mussel, are also jeopardizing some mussel populations. Too late for many species, efforts to maintain habitat quality for mussels and prevent further loss of species, have now become a high priority for many state, federal, and private conservation agencies.

In 1992, with financial support from the U.S. Fish & Wildlife Service, MDIFW initiated surveys to determine the status, abundance, and distribution of the State's rarer species of freshwater mussels. Two of our ten species, the brook floater and yellow lampmussel, are currently listed as candidates for both state and federal Endangered or Threatened Species status. Prior to our survey work, the brook floater was known from only six rivers in Maine, and no more than three living individuals had been found at any site in recent years. The yellow lampmussel seemed slightly better off, with about 10 locations and greater numbers being documented at a few sites.

In the four years since research began, MDIFW has surveyed more than 1,200 sites in rivers and streams throughout Maine. All but northwestern Maine has been surveyed thoroughly. As a result, the brook floater has been found in an additional 25 rivers, several of which appear to have healthy populations. About ten new locations were documented for the yellow lampmussel, but all were based on just a few individuals or empty shells. Other species, the tidewater mucket and the squawfoot, have also been found to be rare. In 1996, the yellow lampmussel and the tidewater mucket were listed as state-threatened. The brook floater may warrant state listing in the future when statewide surveys are complete.

Compared to most states within the range of the brook floater, yellow lampmussel, and tidewater mucket, Maine seems to have some of the best remaining populations and may be the last stronghold for these rare mussels. However, despite the encouraging finds of the past four summers, these species must still be considered rare when survey results are put in perspective by the number of sites searched and number of live individuals found. Also, Maine is not immune to the problems of habitat loss and degradation that have eliminated populations and extirpated species in other parts of the country.

In 1997, MDIFW will expand survey efforts to the upper St. John, Penobscot, and Kennebec watersheds to locate additional occurrences of these rare mussels and continue to learn about their life histories, habitat requirements, status, and conservation needs. At the same time, we will continue to document the occurrence, distribution, and status of all of Maine's freshwater mussels. Unfortunately, very little is known even about species believed to be common. With so many species experiencing dramatic declines throughout the United States, including our neighboring northeastern states, it is becoming more and more important to monitor the status of, and develop conservation plans for, our entire mussel fauna.

—Mark A. McCollough and Beth I. Swartz

Rare dragonflies

Maine's clean, free-flowing rivers may provide a last refuge for some of North America's rarest dragonflies. The pygmy snaketail dragonfly and the extra-striped snaketail dragonfly were recently listed as candidates for the Federal Endangered Species List. These species once had wide distribution throughout Eastern North America, but pollution, dams, and deteriorating water quality have resulted in the extinction of many populations. Entomologists in Maine recently discovered some of the largest known populations of these species in the Penobscot, Allagash, Aroostook, Saco, Machias, and St. Croix watersheds.

Two University of Maine graduate students, Billie Bradeen and Dan Boland, were funded in part by MDIFW and the U.S. Fish and Wildlife Service to study the life history and habitat needs of these dragonflies in the Aroostook River watershed. Their work has provided insights into the status of these rare invertebrates and helped state and federal agencies better understand their conservation needs.

In 1996, MDIFW received an Outdoor Heritage Fund grant to conduct a statewide atlas of the dragonflies and damselflies of Maine. Paul Brunelle of Halifax, Nova Scotia will be gathering all of the historic data on these species; designing a 5-year, volunteer-based, atlas project, and producing fact sheets and a poster of the rare and endangered dragonflies and damselflies of Maine.

In 1995, the banded bog skimmer dragonfly, a candidate for the Federal Endangered Species List, was discovered in York County by MDIFW biologists. This dragonfly, one of the rarest in North America, is known from fewer than 30 sites - most of which have fewer than 50 individuals. The Maine population is now the northernmost population known. In 1996, MDIFW assessed population numbers. Additional studies of population size and habitat use will be made in 1997.

—Mark A. McCollough

Black tern

Most people think of terns as nesting on Maine's coastal islands and beaches. However, one species, the black tern, nests in colonies on freshwater wetlands in central and eastern Maine. Prior to 1990, it was believed Maine's population of black terns was relatively secure, as they were annually observed at traditional nesting sites. In 1991, students at Nokomis High School, under the direction of their student advisor, Don McDougal, and MDIFW biologists, initiated the first state-wide census of the black tern in Maine. They found that the black tern was actually the rarest species of tern in Maine and made a strong case for listing this species as Endangered in the state.

Since then, the U.S. Fish and Wildlife Service has identified the black tern as a candidate for the Federal Endangered Species List, and, in 1996, MDIFW listed the species as Endangered. Black terns nest in New England only in New York, Vermont, and Maine. Their numbers are believed to have declined dramatically in North America in the last two decades.

Nokomis students have continued their annual survey of black terns, thus providing the state with valuable information on this species' status. The number of nesting pairs has increased from 36 pairs in 1991 to about 72 pairs in 1996. Nesting colonies have been found in eight wetlands. In 1996, black terns reoccupied a site at Portage Lake in northern Maine, which hadn't been occupied since 1960.

In 1997, Sarah Dooling, a graduate student at the University of Maine, will begin a 3-year study of black tern ecology and populations.

—Mark A. McCollough

Harlequin duck

Work focusing at several objectives relative to the conservation of the Harlequin Duck was conducted in 1996. Those objectives included 1) ascertaining the status of the wintering population of Harlequins on the Maine coast; 2) developing and testing appropriate inventory techniques for assessing winter populations; 3) working to coordinate regional and national survey, management, and research activities with Canadian and other U.S. interests; 4) conducting a major literature review and data compilation for the harlequin duck in Maine; and 5) drafting a "species assessment."

MDIFW listed the Harlequin duck as a Threatened species, under Maine's Endangered Species Act in 1996. The Harlequin is a wintering and migrant species in Maine. It is recommended for Threatened status under Maine law based on 1) the small number of Harlequins occurring in Maine; 2) the small size of the eastern North American Harlequin population and the substantial portion of that population (estimated as 50%) that winters in Maine; and 3) the fact that more than 90 percent of those Harlequins in Maine are located at fewer than five locations.

A petition has been submitted to the USFWS to federally list the Harlequin as Endangered or Threatened. In Canada, the eastern North American Harlequin population, of which Maine's birds are part, was designated as Endangered in 1990 by the Committee on the Status of Endangered Wildlife in Canada.

The eastern North American population of Harlequins is currently estimated at fewer than 1,000 individuals and may still be declining at an unknown rate. More than half of that population winters along the New England coast, with a significant number of those wintering along Maine's coast.

It is not easy to survey this species because of difficulties in accessing Maine's offshore island locations during winter. However, since 1970, Harlequins have been periodically counted along Maine's coast. Unfortunately, these surveys were not designed to obtain a coast-wide estimate of Harlequins wintering in Maine or to accurately measure changes in populations. For example, birds are surveyed during December-March, which includes the migration periods; only limited areas have been regularly surveyed; and a variety of survey methods have been used (ground, aerial, boat).

The first attempt to conduct a coast-wide estimate of Maine's wintering population was initiated during a 4-day period in February 1995. An estimate of at least 655 Harlequins wintering along the coast of Maine was derived, with 86% occurring around Isle au Haut and the adjacent islands in Jericho and Penobscot Bays.

—Patrick O. Corr & Alan R. Hutchinson

Vernal pools

Many of Maine's amphibians depend on vernal pools as breeding habitat. Some, like spotted salamanders, blue spotted salamanders, and wood frogs use these habitats almost exclusively. In southern Maine, Blanding's and spotted turtles use vernal pools extensively. We know little about why some vernal pools receive greater wildlife use than others. These small wetlands can now potentially be protected under state wetland protection laws.

Funding from the Environmental Protection Agency, the Nongame and Endangered Wildlife Fund, and the Outdoor Heritage Fund are being used to support a study of wildlife values associated with vernal pools in York County. A University of Maine graduate student, Anne Perillo, is studying invertebrate

and amphibian use of 45 vernal pools. Another UM graduate student, Danielle DiMauro, is studying amphibian use of human created vernal pools (skidder ruts, roadside ditches, gravel pits) in forested areas being actively logged. In 1996, MDIFW and Maine Audubon studied amphibian use of vernal pools in southern (York, South Berwick) and central (Edinburg) Maine. Over 50 volunteers attended workshops and assisted in field surveys. In 1997, MDIFW and Maine Audubon will continue studies to evaluate the effectiveness of using low-level aerial photography to locate potential vernal pools in hardwood and softwood dominated settings.

At this time, MDIFW is seeking voluntary, not regulatory, protection of these valuable wildlife habitats. Workshops on vernal pools will be held throughout the state for land managers, educators, land trusts, and land owners. A Maine "Citizen's Guide to Locating and Describing Vernal Pools" was completed. Best Management Practices guidelines for forest management and development are being developed.

—Mark A. McCollough

Amphibian Monitoring

Since 1990, many herpetologists have been concerned that increased ultraviolet light, disease, and habitat loss may be causing amphibian population declines worldwide. MDIFW has no data to assess trends in Maine's amphibian populations. In 1996, MDIFW and Maine Audubon received an Outdoor Heritage Fund grant to initiate a statewide amphibian monitoring program. In 1997, MDIFW will cooperate in a continent-wide survey organized by the U.S. Geological Service. Forty-five frog and toad road monitoring routes will be established. Each spring, volunteers will drive their routes 3 times recording the observations of calling frogs and toads. MDIFW is seeking volunteers to conduct routes and will provide training materials and a cassette tape of the calling amphibians of Maine.

—Mark A. McCollough

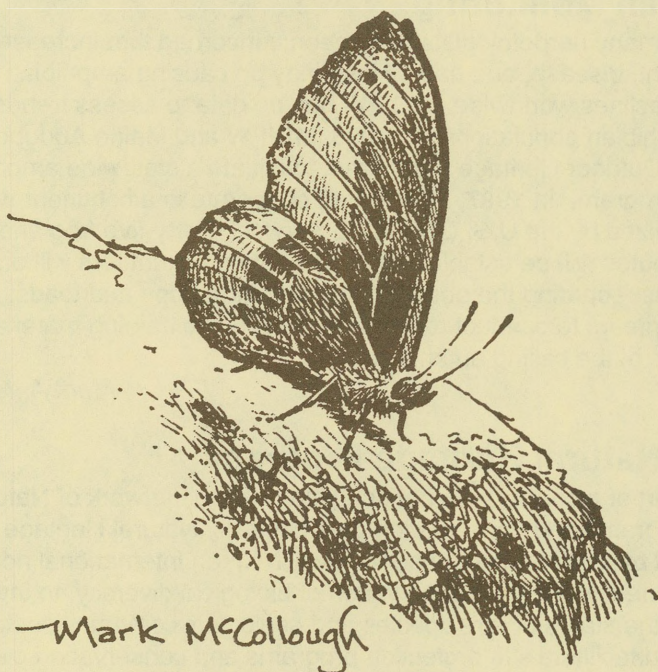
Maine's Natural Heritage Program

MDIFW is part of a cooperative national/international network of Natural Heritage Programs and conservation data centers. Natural Heritage Programs were created by The Nature Conservancy (TNC), an international nonprofit organization devoted to the conservation of biological diversity, to inventory and monitor the status of rare species and ecological communities, track their locations, and facilitate site protection programs and conservation planning. Today, Natural Heritage Programs exist in all 50 states, as well as many other countries, and most are now funded and managed by state or federal agencies that operate cooperatively with TNC.

At the heart of every Natural Heritage Program is the Biological and Conservation Data System (BCD), a complex data management system designed to track information on the status, life history, conservation needs,

and occurrences of rare species and natural communities. As a partner in the Natural Heritage network, MDIFW is responsible for maintaining the zoological portion of the BCD for Maine, while the Natural Areas Program (Maine Department of Conservation) maintains the rare plant and natural community components. MDIFW's zoological database currently contains information on nearly 900 animal species native to our state. It also tracks more than 1,900 known occurrences of rare species in Maine, ranging from bald eagle nest sites to rare freshwater mussel areas and roseate tern nesting islands. This information is invaluable to MDIFW for status assessment, species management, and habitat conservation for Endangered, Threatened, and other rare species. BCD data are also regularly provided to many other state and federal agencies, municipalities, conservation organizations, and landowners, to assist with planning and conservation projects, and to ensure the most current information on Maine's rare species is available to all who need it.

—Beth Swartz



WILDLIFE HABITAT

Staff of the Wildlife Habitat Group in the Bangor office took the lead on several multi-species and landscape level habitat projects. Perhaps the most important of these efforts over the past year was continuation of the Habitat Consultation Area Mapping Project (HCAMP). Completion of these tasks required close coordination with wildlife biologists in the Division's Wildlife Management Section, who collect much of the field data, and with the species specialists in the Wildlife Resource Assessment Section, who conduct/coordinate special surveys. In addition, we worked closely with many state and federal agencies, as well as landowners and private conservation groups. Our primary goal: collect, assemble, and disseminate existing information on habitats of wildlife in Maine to facilitate protection and enhancement.

HABITAT CONSULTATION AREA MAPPING PROJECT (HCAMP)

HCAMP is being implemented by MDIFW, in cooperation with the Maine Natural Areas Program (MNAP) in the Department of Conservation. A grant from the Outdoor Heritage Fund (proceeds from instant lottery games) provided much needed funding to complete this project statewide by mid-1998.

We are developing HCAMP maps, both hardcopy and digital versions with input from other Wildlife Division staff (wildlife habitats) and the MNAP staff (plants and natural communities). Each HCAMP map (based on 1:100,000 scale USGS quadrangles) identifies known locations of all natural features and wildlife habitats that, because of species rarity or special habitat requirements, need to be addressed through regulation, landowner notification, or some level of cooperative habitat protection planning. Locations of these habitats are indicated on the maps by grid cells (roughly 0.23 mi square, or about 150 acres). Grid cells may be "turned on" by:

- Locations of Endangered, Threatened, and special concern plants and wildlife;
- Essential Habitats for Endangered and Threatened species;
- Deer wintering areas;
- Waterfowl and wading bird habitats;
- Shorebird feeding and roosting areas;
- Seabird nesting islands; and
- Other plant and wildlife habitats of concern.

If a proposed project falls within a shaded grid cell on the map, indicating the presence of a habitat of concern, the applicant is encouraged to visit or contact

MDIFW or MNAP. If a project is on or adjacent to any standing or flowing water, Regional Fisheries Biologists should be contacted.

MDIFW and MNAP intend to produce up-to-date maps that highlight these habitats for the public in order to

- facilitate, streamline, and provide predictability to the environmental permitting process;
- help landowners plan, in advance, for impacts of proposed projects on candidate Natural Resource Protection Act (NRPA) Significant Habitats, Essential Habitats for Threatened and Endangered species, and habitats for Threatened and Endangered plants;
- cooperatively work with landowners for land management or project modifications that will retain the value of important natural features and wildlife habitats;
- share knowledge of these special habitats with landowners for their information, appreciation, and planning; and
- standardize, on a statewide basis, permit reviews, and comments on habitat issues to the public by MDIFW and MNAP.

Since many areas defined on the maps include unregulated habitats, the maps provide an opportunity to meet with landowners, notify them of special features of their ownership, and provide guidance on project planning and land management to avoid, or minimize, disturbance to these important areas. Although inventory of these habitats will never be complete, the information presented on the maps is the most current available to MDIFW and MNAP.

When will the HCAMP maps be ready? A pilot project covering the southwestern portion of Maine will be conducted through 1997. This pilot effort will allow Regional staff to use and test the maps and a digital version. During this period, DEP will also be testing the maps as a screening tool: if a project is outside all shaded grid cells, and is not on or adjacent to standing or flowing water, then there is no known wildlife, fisheries, or plant habitat issue to be addressed. In addition, maps will also be provided to other state agencies, towns, regional planning commissions, and other appropriate governmental agencies. At the conclusion of the pilot project, we will make necessary refinements in the mapping project and move on to producing HCAMP maps statewide in 1998.

At some interval, we will update map information, and produce and distribute new maps. Between these updates, information presented on the maps will be the basis for reaction by MDIFW and MNAP to habitat alteration issues. A final important note: THESE ARE INFORMATIONAL MAPS, NOT REGULATORY MAPS.

DEER, WATERFOWL, AND WADING BIRD HABITAT MAPPING

Our Group is making a lot of progress entering Deer Wintering Areas (DWA) and Waterfowl and Wading Bird Habitat (WWH) into the Geographic Information System (GIS). Original maps of DWA currently regulated by LURC have been upgraded (in draft form) to the scale of USGS 7.5' maps, the standard base map of the State Office of GIS (OGIS). We have been working closely with LURC staff, our regional biologists, and several forest landowners to proof existing and redrawn maps. These preliminary revised maps have been digitized with assistance from the Department of Conservation (Northern Forest Lands Project). Ultimately, final maps will be generated by LURC and submitted for rulemaking before adoption. The assistance of several forest landowners in resolving DWA mapping issues and providing digitized versions from their GIS is appreciated.

During the last year, with assistance of regional wildlife biologists, we have been coordinating the digitizing of DWA and WWH in organized towns into GIS. These areas have previously been included on maps provided to towns as part of the comprehensive planning process. Although the boundaries of many areas are preliminary, this is the first step towards providing a tool to track these habitats, to analyze how they occur over the landscape, and to provide input to the Habitat Consultation Areas maps.

OTHER HABITAT PROJECTS

Occurrences of wetland vertebrates and invertebrates in York and Cumberland counties are being entered into the GIS to generate maps of species locations as part of an Endangered and Threatened Species Group project funded by the Environmental Protection Agency. These data will be combined with other "layers" of wetland-related information from southwestern Maine to produce maps of important habitats. The ultimate goal is to identify habitats important to wetland dependent wildlife and develop strategies to protect these habitats.

We are working cooperatively on a number of other projects. The U.S. Forest Service recently completed a forest resurvey of Maine, and Inland Fisheries and Wildlife is preparing to use some of the data collected to assess changes in wildlife habitats since the last U.S. Forest survey (1980-81). We also contributed to the U.S. Biological Survey GAPS project in their efforts to assess species diversity and identify areas of high species diversity in Maine. In addition, our Department has been the major contributor of wildlife data for a coastal island prioritization project. Another effort is underway, in cooperation with the State Office of GIS, Department of Conservation, and other state and federal agencies, to develop land cover/use maps of Maine based on satellite

imagery. These maps will be useful in identifying wildlife habitats and measuring wildlife habitat changes over time.

We are also assisting in mapping habitats for protection under the Natural Resources Protection Act (NRPA). Criteria are being developed by Wildlife Division staff to define these habitats, and existing data are being prepared for the GIS to facilitate habitat mapping and protection. We will be preparing maps and providing them to the Department of Environmental Protection (DEP) for implementation of habitat protection. Preliminary maps for designation of Seabird Nesting Islands for NRPA protection were prepared several years ago and submitted to DEP. We are currently working on identification of tidal wading bird and waterfowl habitats.

Finally, we are continuing to build on our current knowledge of GIS and computer technology to provide the support needed to meet the goals and objectives identified for protection and management of wildlife habitats. We are planning for additional training and integration of new approaches, such as Global Positioning Systems, into our operation to provide support to Wildlife Division staff and gain a better understanding of wildlife habitats. Many challenges lie ahead as the Wildlife Division moves into a more active role of habitat conservation and management to maintain the wildlife populations of Maine. This will require a major effort for the Wildlife Division team.

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Using the Geographic Information System (GIS), the Habitat Group staff is able to track a wide variety of wildlife habitats with digital data, analyze these data, and generate maps of important habitats for protection and management. For the past year, we continued to focus much of our effort on entering mapped boundaries or point locations into the GIS. This process is referred to as "digitizing," or creating a computerized digital version of the hardcopy maps. Inland Fisheries and Wildlife is using standard base maps generated by the State Office of GIS (OGIS) on which to locate many of the wildlife occurrences and habitats. In addition to digitizing the mapped features or habitats (deer wintering areas, seabird nesting islands, bald eagle nests, etc.), information about these features or habitats is also being entered so we can determine how and when these locations are being utilized by wildlife. Using the GIS, maps can be produced for biologists in Bangor, biologists in our regional offices, other agencies, landowners, conservation groups, etc. for general information, regulatory purposes, planning, and many other uses. Habitat Consultation Area maps (see above description) is one example of such maps produced using the GIS.

Major projects (described above) which required the use of GIS over the past year included development of Habitat Consultation Area maps (HCAMP);

continuing work on identification of sensitive coastal wildlife areas for marine oil spill response; entry of Deer Wintering Areas (DWA) regulated by the Land Use Regulation Commission (LURC) into GIS; digitizing of DWA and Waterfowl/Wading Bird Habitats (WWH) in southern and western Maine; tracking Essential Habitats for Endangered or Threatened species; and mapping locations of Endangered, Threatened, or Special Concern species being tracked in the wildlife portion of the Natural Heritage database.

—*Rich Dressler and Mark Caron*

OIL SPILL RESPONSE AND PLANNING

***Julie N* spill response**

Although the Wildlife Division staff has been working on the marine oil spill response contingency plan for the past several years, we hoped the plan would never have to be used. Our luck ran out in late September, 1996! At approximately 11:05 am on September 27, the Tank Vessel *Julie N*, inbound to Portland harbor with a cargo of 8.8 million gallons of #2 diesel fuel, struck the south side of the draw span of the Million Dollar Bridge. In the collision with the bridge, the *Julie N* received substantial hull damage losing over 93,000 gallons of bunker fuel (heavy oil used to power the ship) and about 87,000 gallons of #2 diesel.

The Bangor office of MDIFW was alerted about the spill shortly after noon on the 27th. Region A (Gray) and B (Sidney) wildlife biologists were notified. They immediately proceeded to Portland Friday afternoon to investigate the extent of damage and determine if wildlife were in the area affected by the spill. Meanwhile, biologists from Bangor office took a trailer loaded with oil spill response supplies and headed to Portland to implement our response plan.

From the outset it was clear this was not a small spill. In addition, there were reports of oil sheens in Casco Bay. While there was concern the spill had spread into Casco Bay, field surveys revealed most of the oil was confined to the Fore River. Information available from the U.S. Coast Guard and DEP Friday evening indicated that a lot of the spilled oil was contained in booms installed around the ship, which had proceeded to the Sprague Terminal immediately after the collision.

Based on information collected Friday, we decided to initiate the wildlife rehabilitation plan to deal with oiled birds, and called the state rehabilitation contractor, International Bird Rescue and Research Center (IBRRC), to send a representative to Portland. We also contacted Wildlife Division biologists from as far away as Machias, Enfield, and Farmington for assistance - the response was fantastic! Staff dropped personal plans and traveled to Portland to work over the weekend. Little did we know MDIFW's response operation would continue for almost 3 weeks.

Saturday, September 28, our crew began a wide search of Casco Bay area by boat and on the ground looking for oil, oiled birds, or oiled habitat. We confirmed that damage was largely confined to the Fore River, and birds potentially affected numbered in the hundreds rather than thousands. Saturday was also a transition day in terms of getting set up at the Command Center (Naval Reserve Center in Portland) and initiating the state wildlife rehabilitation plan. Tri-State Bird Rescue (wildlife rehabilitator from Delaware) was called in to clean oiled birds by the ship owner's representatives, the Responsible Party (RP). Fortunately, we had an existing agreement with the Maine National Guard to use the nearby South Portland Armory for wildlife rehabilitation operations. By Saturday evening, this facility was set up and ready to take birds.

On Sunday, September 29, our field operation went into high gear, with almost 20 MDIFW Wildlife Division staff involved. The priority was to assess damages (count birds, determine degree of oiling) and, if possible, capture oiled birds. Captured birds were taken to the wildlife rehabilitation center. Dead birds were turned over to USFWS law enforcement, to establish chain-of-custody for this evidence to document natural resource damage. Daily field work continued over the next 2 1/2 weeks, but field crews were scaled back as the operation wound down. An established protocol was followed and refined, as needed, to monitor wildlife exposure to the oil. We also monitored the extent of the oiled habitat.

At the Command Center, operations were getting into high gear. The center was a beehive of activity with a variety of computer and high tech gear in operation (most of it brought in by the RP contractors and the Federal agencies), constant ringing of telephones/cell phones, impromptu meetings, and people coming and going via boats, helicopters, and vehicles.

Our first response staff found they were stretched too thin to coordinate activities at the Command Center and be involved in field efforts. Additional Wildlife Division staff were called into the Command Center to help deal with issues there, including coordinating with other agencies and RP consultants, developing proposals for continuation of the field work to do damage assessment; attending numerous meetings to address issues related to shoreline cleanup; solving logistics problems; press releases; etc. Meanwhile, field crew coordinators kept an eye on the rehab operation and also began organizing data collected during surveys within the Fore River.

In addition, our Bird Group leader initiated helicopter over-flights to assess birds present in the Portland area. Oiled birds were found outside the immediate Fore River area, thus we needed to determine numbers and species of birds in the general area that potentially came in contact with the oil.

A key habitat concern was oiled marsh grass. The spill occurred during a very high tide, coupled with high winds out of the south. Consequently, heavy oiling

of marsh grass occurred on the north shore of the upper Fore River. However, because of high potential for long term damage to the marsh habitat with available cleaning techniques, a decision was made to do nothing and let nature take its course (IF&W did recommend carefully cutting the grass on two plots for testing purposes). Because the oiled grass was left in place, our primary concern was potential exposure of migrating waterfowl to this oil. We are continuing to monitor bird use of areas oiled during the spill.

The next step in the process is the formal Natural Resource Damage Assessment (NRDA). Based on studies completed through December 1996, an assessment process will begin to determine the nature and extent of damage. Based on the extent of damage, a process will be initiated to restore damaged natural resources or compensate the citizens of Maine for losses.

Maine oil spill response and planning

Although the response to the *Julie N* spill was a good test of our preparedness, oil spill planning efforts initiated in 1991 have continued, in coordination with wildlife species specialists and regional biologists, to identify sensitive coastal wildlife areas that will need protection in the event of a marine oil spill. Occurrence information collected over more than a decade for a variety of coastal species (shorebirds, seabirds, waterfowl, wading birds, seals, Endangered or Threatened species, etc.) were analyzed to determine areas with species most sensitive to oil spills. Those areas will be given the highest priority during oil spill response and cleanup. With our input, the DEP is preparing Environmental Vulnerability Index (EVI) or oil spill response maps. We are continuing to develop and provide current coastal wildlife information to update these maps. In addition, we have been working to identify specific habitats that should be protected from oil spills throughout the year.

Another component of our oil spill planning efforts is wildlife rehabilitation. We are working closely with the DEP to implement the wildlife rehabilitation plan outlined in the Marine Oil Spill Contingency Plan for the State of Maine. A major component of this plan is training state/federal agency staff and volunteers to conduct wildlife rehabilitation. In coordination with the State wildlife rehabilitation contractor, International Bird Rescue and Research Center, we conducted another intensive 2-day training session for agency staff and other individuals in 1996, as well as a refresher course for those individuals previously trained. A 1-day training session was held for volunteers in Augusta. In addition to training, we are working on procurement of rehabilitation materials and equipment, in preparation for oil spill response. We have completed a Memorandum of Agreement with the Maine National Guard to use their facilities for wildlife rehabilitation during an oil spill.

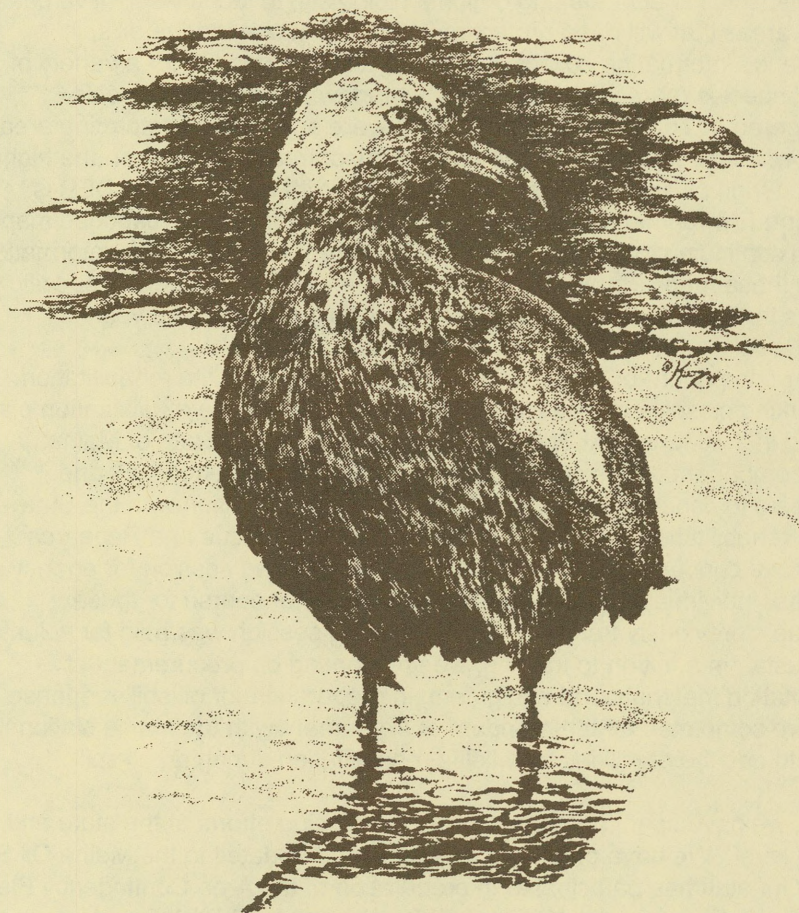
Finally, we have spent numerous hours in planning efforts at the state and federal level. We have provided comments and updates to the Maine Oil Spill Plan. Our staff has participated in preparation of the Area Contingency Plan, a Federal effort coordinated by the U.S. Coast Guard. This plan addresses oil

spill response efforts for the coast of Maine and New Hampshire. Inland Fisheries and Wildlife is represented by the Habitat Group on the Area Committee, a group of State and Federal agency representatives authorized to approve the Area Plan. We are coordinating with our neighbors, New Hampshire and New Brunswick, through Federal oil spill planning and exercise efforts. We are also working directly with the U.S. Fish and Wildlife Service to address oil spill related issues of common interest.

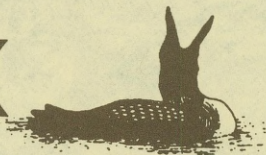
—John Kenney and Rich Dressler

If you are interested in volunteering to help rehabilitate oiled birds and wildlife during a marine oil spill, please mail your name, address, and daytime phone number to:

***Maine Department of Inland Fisheries and Wildlife
ATTN: Oil Spill Volunteer
650 State Street
Bangor, ME 04401-5654***



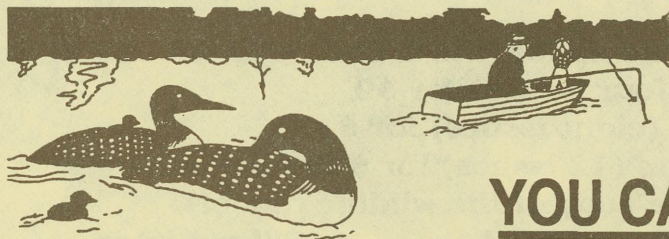
LOONS & LEAD DON'T MIX



Lead tackle is deadly to waterbirds!

Lead sinkers & jigs cause fatal lead poisoning in loons and other waterfowl.

Lead ingestion is the #1 killer of loons in Maine, but any waterbird can die from swallowing just one lead sinker or jig!



YOU CAN:

Use steel, tin, bismuth or plastic instead
Ask local tackle shops to stock alternatives
Properly dispose of old lead sinkers & jigs



Maine Department of Inland Fisheries and Wildlife

Maine's Best Outdoor Magazine!

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See reverse side for a description of this colorful and informative new guide!

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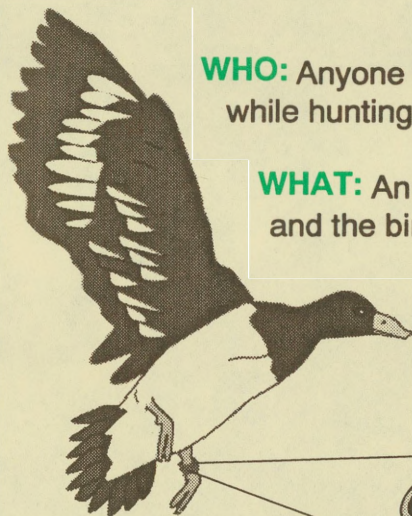
NOTES

WANTED

Band Recovery Reports

New Reporting Procedures Now Available

CALL 1-800-327-BAND



WHO: Anyone finding a band or recovering one while hunting

WHAT: An operator will take the band report, and the bird banding laboratory will respond with banding information much faster than previously

WHEN: Weekdays between 7:00 a.m. and 5:00 p.m. Eastern Time. After hours and weekend calls will be handled by voice mail services

WHERE: The new number is effective anywhere in Canada, the United States, and most of the Caribbean

WHY: Studies have proven this method significantly improves the reporting rate over previous methods. Results will provide better estimates of survival and harvest rates and will reduce high costs associated with banding studies.

***Supported by state fish and wildlife agencies,
the United States Fish and Wildlife Service, and
the United States National Biological Service***